

Сборник заданий для БДЗ по
вычислительной математике

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1 Задание I

I. Даны числа A_i и B_i . Записать их с одной, двумя, тремя и четырьмя значащими цифрами.

$$A_1 = 924,1839; B_1 = 0,0038786$$

$$A_2 = 17,615876; B_2 = 0,0096313$$

$$A_3 = 28437,3; B_3 = 0,47348326$$

$$A_4 = 834855,3; B_4 = 0,00671256$$

$$A_5 = 678647,4; B_5 = 0,0316121$$

$$A_6 = 27,432; B_6 = 0,00032947913$$

$$A_7 = 133499; B_7 = 0,06277344$$

$$A_8 = 7994,592; B_8 = 0,000984882$$

$$A_9 = 5377,6983; B_9 = 0,000346838$$

$$A_{10} = 79564,9; B_{10} = 0,034213653$$

$$A_{11} = 774521; B_{11} = 0,0000924379$$

$$A_{12} = 7261,1; B_{12} = 0,00382939$$

$$A_{13} = 321,624; B_{13} = 0,000035612775$$

$$A_{14} = 1447,6396; B_{14} = 0,92577$$

$$A_{15} = 23397,25; B_{15} = 0,0013794732$$

$$A_{16} = 144,349; B_{16} = 0,0000453312$$

$$A_{17} = 975611; B_{17} = 0,000071882$$

$$A_{18} = 7759,3; B_{18} = 0,00004996121$$

$$A_{19} = 89,57213; B_{19} = 0,0000485225$$

$$A_{20} = 3459,59; B_{20} = 0,000294726$$

$$A_{21} = 212,49633; B_{21} = 0,000182425$$

$$A_{22} = 213593,6; B_{22} = 0,000471919$$

$$A_{23} = 26,96564; B_{23} = 0,368959$$

$$A_{24} = 989924,6; B_{24} = 0,86953$$

$$A_{25} = 56,597; B_{25} = 0,00588337$$

$$A_{26} = 19686,3; B_{26} = 0,00689946$$

$$A_{27} = 23,665566; B_{27} = 0,0000573295$$

$$A_{28} = 84262,765; B_{28} = 0,002721265$$

$$A_{29} = 71,785154; B_{29} = 0,00037556899$$

$$A_{30} = 5895,8; B_{30} = 0,0289551$$

$$A_{31} = 133,298; B_{31} = 0,0066425$$

$A_{32} = 44598,837; B_{32} = 0,0000692297$
 $A_{33} = 78422,7; B_{33} = 0,0255167$
 $A_{34} = 7249,98; B_{34} = 0,000614337$
 $A_{35} = 543373,8; B_{35} = 0,48266379$
 $A_{36} = 561,34587; B_{36} = 0,000046967$
 $A_{37} = 254899,34; B_{37} = 0,00005726164$
 $A_{38} = 36984,973; B_{38} = 0,00012683338$
 $A_{39} = 3972,3; B_{39} = 0,0024788414$
 $A_{40} = 36,12515; B_{40} = 0,78749122$
 $A_{41} = 4613,28; B_{41} = 0,00068442$
 $A_{42} = 854156; B_{42} = 0,000077992162$
 $A_{43} = 167,59; B_{43} = 0,48468$
 $A_{44} = 745299,6; B_{44} = 0,09364686$
 $A_{45} = 18,357; B_{45} = 0,811295$
 $A_{46} = 69,9634; B_{46} = 0,027411294$
 $A_{47} = 639439; B_{47} = 0,0008731272$
 $A_{48} = 7318,7287; B_{48} = 0,00032847935$
 $A_{49} = 29,3163; B_{49} = 0,0000463786$
 $A_{50} = 185,876; B_{50} = 0,084981$
 $A_{51} = 861,76; B_{51} = 0,004154284$
 $A_{52} = 6759,41; B_{52} = 0,536151$
 $A_{53} = 5372,39; B_{53} = 0,061657$
 $A_{54} = 151373,3; B_{54} = 0,00729113$
 $A_{55} = 997,631; B_{55} = 0,0683377$
 $A_{56} = 47875,443; B_{56} = 0,000774477$
 $A_{57} = 3257,285; B_{57} = 0,08862676$
 $A_{58} = 5195,5; B_{58} = 0,00723215$
 $A_{59} = 89,439264; B_{59} = 0,775731$
 $A_{60} = 819742; B_{60} = 0,0072973981$
 $A_{61} = 4237,2; B_{61} = 0,000422112$
 $A_{62} = 15594,884; B_{62} = 0,0069922236$
 $A_{63} = 639,53971; B_{63} = 0,005914292$
 $A_{64} = 846,621; B_{64} = 0,002614373$
 $A_{65} = 51246,1; B_{65} = 0,82988$
 $A_{66} = 625,5651; B_{66} = 0,000893163$

$A_{67} = 34871,92; B_{67} = 0,0008195766$
 $A_{68} = 4171,16; B_{68} = 0,0033125$
 $A_{69} = 42624,9; B_{69} = 0,06359845$
 $A_{70} = 654,42; B_{70} = 0,0000447618$
 $A_{71} = 488,855; B_{71} = 0,00094511174$
 $A_{72} = 58475,8; B_{72} = 0,14559$
 $A_{73} = 2685,6772; B_{73} = 0,00056571$
 $A_{74} = 87,59419; B_{74} = 0,71161762$
 $A_{75} = 654818,83; B_{75} = 0,0002619561$
 $A_{76} = 158,58; B_{76} = 0,087675744$
 $A_{77} = 15488,6; B_{77} = 0,65692$
 $A_{78} = 4812,22; B_{78} = 0,041687$
 $A_{79} = 7923,53; B_{79} = 0,378339$
 $A_{80} = 44,655; B_{80} = 0,00916194$
 $A_{81} = 39956,827; B_{81} = 0,0007913113$
 $A_{82} = 6845,179; B_{82} = 0,0000692553$
 $A_{83} = 92,31959; B_{83} = 0,000882835$
 $A_{84} = 6631,2; B_{84} = 0,0959766$
 $A_{85} = 944274,5; B_{85} = 0,0000331136$
 $A_{86} = 26,986452; B_{86} = 0,021445$
 $A_{87} = 5118,56; B_{87} = 0,000073827$
 $A_{88} = 94,79737; B_{88} = 0,0031149$
 $A_{89} = 8146,73; B_{89} = 0,037536717$
 $A_{90} = 1286,684; B_{90} = 0,000116655$
 $A_{91} = 1557,135; B_{91} = 0,000781983$
 $A_{92} = 7868,7245; B_{92} = 0,0000718359$
 $A_{93} = 48973,464; B_{93} = 0,0000517688$
 $A_{94} = 424,73226; B_{94} = 0,029974663$
 $A_{95} = 42477,96; B_{95} = 0,0008134633$
 $A_{96} = 2552,5; B_{96} = 0,0011945588$
 $A_{97} = 319,94514; B_{97} = 0,000623844$
 $A_{98} = 98,23398; B_{98} = 0,0041127$
 $A_{99} = 76893,5; B_{99} = 0,7127657$
 $A_{100} = 88,363; B_{100} = 0,0934935$

2 Задание II

II. Даны число A_i с верными цифрами в записи.

1. Округлить до n_i значащих цифр.

2. Найти абсолютную и относительную ошибку округления.

3. Сформировать предельную абсолютную и относительную погрешности округления.

$$A_1 = 592,41839; n_1 = 5;$$

$$A_2 = 86,8941; n_2 = 2;$$

$$A_3 = 158,76; n_3 = 2;$$

$$A_4 = 13175,928; n_4 = 4;$$

$$A_5 = 347348,32; n_5 = 4;$$

$$A_6 = 7483,4; n_6 = 2;$$

$$A_7 = 367125,6; n_7 = 6;$$

$$A_8 = 167864; n_8 = 2;$$

$$A_9 = 161,216; n_9 = 5;$$

$$A_{10} = 274,32; n_{10} = 1;$$

$$A_{11} = 4791,354; n_{11} = 4;$$

$$A_{12} = 334996,2; n_{12} = 5;$$

$$A_{13} = 44,7279; n_{13} = 4;$$

$$A_{14} = 459,29848; n_{14} = 4;$$

$$A_{15} = 687,5377; n_{15} = 3;$$

$$A_{16} = 33,4683; n_{16} = 4;$$

$$A_{17} = 13,7956; n_{17} = 5;$$

$$A_{18} = 421365,3; n_{18} = 5;$$

$$A_{19} = 177452; n_{19} = 4;$$

$$A_{20} = 437929,3; n_{20} = 2;$$

$$A_{21} = 61138,2; n_{21} = 1;$$

$$A_{22} = 193532; n_{22} = 1;$$

$$A_{23} = 43561,2; n_{23} = 4;$$

$$A_{24} = 42961,447; n_{24} = 4;$$

$$A_{25} = 692,5778; n_{25} = 5;$$

$$A_{26} = 2339,725; n_{26} = 3;$$

$$A_{27} = 947,3293; n_{27} = 4;$$

$$A_{28} = 44349,4; n_{28} = 3;$$

$A_{29} = 129,93997; n_{29} = 6;$
 $A_{30} = 171882,9; n_{30} = 5;$
 $A_{31} = 77,593; n_{31} = 2;$
 $A_{32} = 612168,6; n_{32} = 4;$
 $A_{33} = 572134,8; n_{33} = 5;$
 $A_{34} = 554,85345; n_{34} = 6;$
 $A_{35} = 294,726; n_{35} = 5;$
 $A_{36} = 321,2496; n_{36} = 3;$
 $A_{37} = 82,4255; n_{37} = 5;$
 $A_{38} = 213,5936; n_{38} = 5;$
 $A_{39} = 9193,4272; n_{39} = 6;$
 $A_{40} = 5643,6; n_{40} = 2;$
 $A_{41} = 94,4919; n_{41} = 3;$
 $A_{42} = 24686,95; n_{42} = 3;$
 $A_{43} = 3956,59; n_{43} = 3;$
 $A_{44} = 83,378119; n_{44} = 7;$
 $A_{45} = 86,368994; n_{45} = 7;$
 $A_{46} = 292366,5; n_{46} = 4;$
 $A_{47} = 57,329; n_{47} = 2;$
 $A_{48} = 238426,2; n_{48} = 4;$
 $A_{49} = 272126,53; n_{49} = 7;$
 $A_{50} = 717,85154; n_{50} = 4;$
 $A_{51} = 568995,7; n_{51} = 2;$
 $A_{52} = 895,828; n_{52} = 4;$
 $A_{53} = 14,64213; n_{53} = 3;$
 $A_{54} = 86642,525; n_{54} = 7;$
 $A_{55} = 4598,83; n_{55} = 5;$
 $A_{56} = 2297,1; n_{56} = 3;$
 $A_{57} = 78422,7; n_{57} = 3;$
 $A_{58} = 16,774277; n_{58} = 6;$
 $A_{59} = 986143,3; n_{59} = 5;$
 $A_{60} = 38543,3; n_{60} = 4;$
 $A_{61} = 4826,6; n_{61} = 2;$
 $A_{62} = 38675,613; n_{62} = 4;$
 $A_{63} = 746967,35; n_{63} = 6;$

$A_{64} = 54899,34; n_{64} = 4;$
 $A_{65} = 61645,1; n_{65} = 3;$
 $A_{66} = 69,849731; n_{66} = 5;$
 $A_{67} = 33381,2; n_{67} = 3;$
 $A_{68} = 9723,2478; n_{68} = 6;$
 $A_{69} = 42,4933; n_{69} = 3;$
 $A_{70} = 5157,87; n_{70} = 5;$
 $A_{71} = 2264,32; n_{71} = 5;$
 $A_{72} = 32868,44; n_{72} = 5;$
 $A_{73} = 5285,4156; n_{73} = 5;$
 $A_{74} = 9216,2; n_{74} = 1;$
 $A_{75} = 616,759; n_{75} = 5;$
 $A_{76} = 68172,3; n_{76} = 2;$
 $A_{77} = 2996,9; n_{77} = 4;$
 $A_{78} = 6869,364; n_{78} = 4;$
 $A_{79} = 57,8112; n_{79} = 5;$
 $A_{80} = 1446,9963; n_{80} = 5;$
 $A_{81} = 41,129; n_{81} = 1;$
 $A_{82} = 53639,4; n_{82} = 4;$
 $A_{83} = 731272; n_{83} = 2;$
 $A_{84} = 9731,8; n_{84} = 1;$
 $A_{85} = 732847; n_{85} = 4;$
 $A_{86} = 27652,93; n_{86} = 3;$
 $A_{87} = 463786,9; n_{87} = 3;$
 $A_{88} = 18587,6; n_{88} = 5;$
 $A_{89} = 814,26; n_{89} = 3;$
 $A_{90} = 17641,54; n_{90} = 3;$
 $A_{91} = 284,4675; n_{91} = 4;$
 $A_{92} = 5361,51; n_{92} = 3;$
 $A_{93} = 8537,23; n_{93} = 4;$
 $A_{94} = 65,7987; n_{94} = 5;$
 $A_{95} = 137337; n_{95} = 2;$
 $A_{96} = 135748,9; n_{96} = 3;$
 $A_{97} = 3168,33; n_{97} = 4;$
 $A_{98} = 895,4787; n_{98} = 6;$

$$A_{99} = 37744,7; n_{99} = 1;$$

$$A_{100} = 323257; n_{100} = 4;$$

3 Задание III

III. Числа A_i и B_i имеют относительные погрешности равные $\delta_A\%$ и $\delta_B\%$ соответственно. Указать верные значащие цифры.

$$A_1 = 418,39387; B_1 = 0,00868941$$

$$\delta_A = 0,004\%; \delta_B = 10\%$$

$$A_2 = 769,63131; B_2 = 0,7592843$$

$$\delta_A = 7\%; \delta_B = 0,7\%$$

$$A_3 = 832,6627; B_3 = 0,004834855$$

$$\delta_A = 0,003\%; \delta_B = 0,009\%$$

$$A_4 = 65,561678; B_4 = 0,0000647431$$

$$\delta_A = 0,8\%; \delta_B = 0,04\%$$

$$A_5 = 69274,323; B_5 = 0,294791$$

$$\delta_A = 0,001\%; \delta_B = 0,009\%$$

$$A_6 = 33,499627; B_6 = 0,734472$$

$$\delta_A = 0,06\%; \delta_B = 2\%$$

$$A_7 = 59,2984; B_7 = 0,000882468753$$

$$\delta_A = 0,06\%; \delta_B = 0,04\%$$

$$A_8 = 34683,87; B_8 = 0,09137956$$

$$\delta_A = 0,2\%; \delta_B = 1\%$$

$$A_9 = 365365,7; B_9 = 0,00177452192$$

$$\delta_A = 4\%; \delta_B = 0,009\%$$

$$A_{10} = 38726,1; B_{10} = 0,0138293$$

$$\delta_A = 8\%; \delta_B = 0,6\%$$

$$A_{11} = 21,6243; B_{11} = 0,0005612775$$

$$\delta_A = 0,09\%; \delta_B = 6\%$$

$$A_{12} = 4763,96925; B_{12} = 0,778896$$

$$\delta_A = 0,004\%; \delta_B = 1\%$$

$$A_{13} = 51,379473; B_{13} = 0,00293381443$$

$$\delta_A = 0,3\%; \delta_B = 0,5\%$$

$$A_{14} = 12993,9975; B_{14} = 0,006117188$$

$$\delta_A = 0,002\%; \delta_B = 0,006\%$$

$$A_{15} = 75,93499; B_{15} = 0,00612168$$

$$\delta_A = 0,05\%; \delta_B = 0,08\%$$

$$A_{16} = 213485,2; B_{16} = 0,255485$$

$\delta_A = 1\%; \delta_B = 0,005\%$
 $A_{17} = 29,4726; B_{17} = 0,0089632124$
 $\delta_A = 0,02\%; \delta_B = 5\%$
 $A_{18} = 24255,49; B_{18} = 0,002213593$
 $\delta_A = 0,007\%; \delta_B = 0,08\%$
 $A_{19} = 934272,696; B_{19} = 0,005643689$
 $\delta_A = 0,008\%; \delta_B = 6\%$
 $A_{20} = 989924,6; B_{20} = 0,86953973$
 $\delta_A = 0,03\%; \delta_B = 0,9\%$
 $A_{21} = 58833,781; B_{21} = 0,00191968636$
 $\delta_A = 0,003\%; \delta_B = 9\%$
 $A_{22} = 22,9236; B_{22} = 0,006556657$
 $\delta_A = 0,006\%; \delta_B = 0,8\%$
 $A_{23} = 238426,2; B_{23} = 0,000076527212$
 $\delta_A = 0,06\%; \delta_B = 6\%$
 $A_{24} = 7178,51543; B_{24} = 0,0000755689$
 $\delta_A = 9\%; \delta_B = 0,1\%$
 $A_{25} = 8958,28955; B_{25} = 0,00146421$
 $\delta_A = 0,001\%; \delta_B = 0,07\%$
 $A_{26} = 642525,334; B_{26} = 0,0459883$
 $\delta_A = 0,3\%; \delta_B = 0,06\%$
 $A_{27} = 7177,278; B_{27} = 0,0422725516$
 $\delta_A = 0,007\%; \delta_B = 0,4\%$
 $A_{28} = 249,98614; B_{28} = 0,003371238$
 $\delta_A = 7\%; \delta_B = 9\%$
 $A_{29} = 8482,66379; B_{29} = 0,0003867561$
 $\delta_A = 0,08\%; \delta_B = 6\%$
 $A_{30} = 6967,35512; B_{30} = 0,5489934$
 $\delta_A = 0,02\%; \delta_B = 10\%$
 $A_{31} = 45127,36; B_{31} = 0,00098497312$
 $\delta_A = 0,004\%; \delta_B = 0,009\%$
 $A_{32} = 12,6639723; B_{32} = 0,0247884$
 $\delta_A = 0,08\%; \delta_B = 0,1\%$
 $A_{33} = 361251,5; B_{33} = 0,000787491$
 $\delta_A = 0,02\%; \delta_B = 0,003\%$

$A_{34} = 461,328684; B_{34} = 0,004217528$
 $\delta_A = 0,008\%; \delta_B = 0,04\%$
 $A_{35} = 79,921625; B_{35} = 0,00047616759$
 $\delta_A = 8\%; \delta_B = 0,2\%$
 $A_{36} = 72374,529; B_{36} = 0,009693646$
 $\delta_A = 0,09\%; \delta_B = 0,5\%$
 $A_{37} = 1835,781; B_{37} = 0,1295514$
 $\delta_A = 8\%; \delta_B = 0,08\%$
 $A_{38} = 42741,1294; B_{38} = 0,0125363$
 $\delta_A = 7\%; \delta_B = 3\%$
 $A_{39} = 312,72513; B_{39} = 0,0973187$
 $\delta_A = 0,04\%; \delta_B = 0,7\%$
 $A_{40} = 479352,765; B_{40} = 0,0293163463$
 $\delta_A = 4\%; \delta_B = 0,05\%$
 $A_{41} = 51858,768; B_{41} = 0,0049814265$
 $\delta_A = 0,06\%; \delta_B = 0,01\%$
 $A_{42} = 1542,84284; B_{42} = 0,0000467594153$
 $\delta_A = 0,9\%; \delta_B = 0,008\%$
 $A_{43} = 28537,2; B_{43} = 0,000396165$
 $\delta_A = 7\%; \delta_B = 6\%$
 $A_{44} = 51373,372; B_{44} = 0,9113574$
 $\delta_A = 10\%; \delta_B = 0,02\%$
 $A_{45} = 168,337; B_{45} = 0,7889547$
 $\delta_A = 0,006\%; \delta_B = 0,002\%$
 $A_{46} = 7744,7793; B_{46} = 0,323257$
 $\delta_A = 0,5\%; \delta_B = 5\%$
 $A_{47} = 26,7627575; B_{47} = 0,00001955723$
 $\delta_A = 0,5\%; \delta_B = 0,06\%$
 $A_{48} = 38943,9264; B_{48} = 0,00007757311$
 $\delta_A = 7\%; \delta_B = 9\%$
 $A_{49} = 7427,29739; B_{49} = 0,0818786$
 $\delta_A = 0,007\%; \delta_B = 0,007\%$
 $A_{50} = 22,11245; B_{50} = 0,00381559$
 $\delta_A = 0,003\%; \delta_B = 0,001\%$
 $A_{51} = 922236,4; B_{51} = 0,621639$

$\delta_A = 0,007\%$; $\delta_B = 0,1\%$
 $A_{52} = 914292,2$; $B_{52} = 0,00002398466$
 $\delta_A = 0,006\%$; $\delta_B = 8\%$
 $A_{53} = 37,371215$; $B_{53} = 0,0012461829$
 $\delta_A = 0,6\%$; $\delta_B = 2\%$
 $A_{54} = 6255,65189$; $B_{54} = 0,0316318$
 $\delta_A = 6\%$; $\delta_B = 0,01\%$
 $A_{55} = 192819,5$; $B_{55} = 0,0007661156$
 $\delta_A = 0,09\%$; $\delta_B = 0,7\%$
 $A_{56} = 331251,15$; $B_{56} = 0,742624963$
 $\delta_A = 0,009\%$; $\delta_B = 0,06\%$
 $A_{57} = 39565,442$; $B_{57} = 0,447618$
 $\delta_A = 0,007\%$; $\delta_B = 0,005\%$
 $A_{58} = 885,5945$; $B_{58} = 0,000111747246$
 $\delta_A = 0,07\%$; $\delta_B = 5\%$
 $A_{59} = 14559,7375$; $B_{59} = 0,0268567$
 $\delta_A = 0,002\%$; $\delta_B = 0,3\%$
 $A_{60} = 1114,9875$; $B_{60} = 0,000941971161$
 $\delta_A = 0,007\%$; $\delta_B = 0,4\%$
 $A_{61} = 56548,188$; $B_{61} = 0,326195$
 $\delta_A = 8\%$; $\delta_B = 1\%$
 $A_{62} = 1585,88$; $B_{62} = 0,000767574472$
 $\delta_A = 0,04\%$; $\delta_B = 6\%$
 $A_{63} = 8665,69$; $B_{63} = 0,0236254812$
 $\delta_A = 0,007\%$; $\delta_B = 0,05\%$
 $A_{64} = 76637,792$; $B_{64} = 0,000353378$
 $\delta_A = 0,003\%$; $\delta_B = 0,008\%$
 $A_{65} = 5446,559$; $B_{65} = 0,0016194772$
 $\delta_A = 10\%$; $\delta_B = 0,009\%$
 $A_{66} = 82,7791311$; $B_{66} = 0,039841684$
 $\delta_A = 9\%$; $\delta_B = 0,1\%$
 $A_{67} = 25539,91$; $B_{67} = 0,0492319598$
 $\delta_A = 0,03\%$; $\delta_B = 0,05\%$
 $A_{68} = 34,3663129$; $B_{68} = 0,00005976622$
 $\delta_A = 0,8\%$; $\delta_B = 0,06\%$

$A_{69} = 745,331; B_{69} = 0,136678$
 $\delta_A = 0,04\%; \delta_B = 0,06\%$
 $A_{70} = 452214,457; B_{70} = 0,0000585511856$
 $\delta_A = 3\%; \delta_B = 0,02\%$
 $A_{71} = 632947,9; B_{71} = 0,0007373114$
 $\delta_A = 2\%; \delta_B = 3\%$
 $A_{72} = 14673,3; B_{72} = 0,007536717$
 $\delta_A = 0,004\%; \delta_B = 0,07\%$
 $A_{73} = 8668,4116; B_{73} = 0,0006558648$
 $\delta_A = 0,05\%; \delta_B = 10\%$
 $A_{74} = 5781,98327; B_{74} = 0,46786872$
 $\delta_A = 0,007\%; \delta_B = 0,4\%$
 $A_{75} = 598757,4; B_{75} = 0,0000897346$
 $\delta_A = 4\%; \delta_B = 6\%$
 $A_{76} = 8242,64; B_{76} = 0,24732262$
 $\delta_A = 3\%; \delta_B = 0,004\%$
 $A_{77} = 33,161424; B_{77} = 0,0779681$
 $\delta_A = 0,003\%; \delta_B = 5\%$
 $A_{78} = 156255,2; B_{78} = 0,051194558$
 $\delta_A = 0,004\%; \delta_B = 8\%$
 $A_{79} = 19945,1; B_{79} = 0,000462384495$
 $\delta_A = 8\%; \delta_B = 0,009\%$
 $A_{80} = 398,4112; B_{80} = 0,00766227$
 $\delta_A = 0,03\%; \delta_B = 0,02\%$
 $A_{81} = 12765,73; B_{81} = 0,0328883$
 $\delta_A = 0,03\%; \delta_B = 0,006\%$
 $A_{82} = 356911,7; B_{82} = 0,00004848449$
 $\delta_A = 6\%; \delta_B = 9\%$
 $A_{83} = 8822,21; B_{83} = 0,5437752$
 $\delta_A = 0,003\%; \delta_B = 0,002\%$
 $A_{84} = 447692,3; B_{84} = 0,18563122$
 $\delta_A = 0,01\%; \delta_B = 0,2\%$
 $A_{85} = 59839,58; B_{85} = 0,000048759555$
 $\delta_A = 2\%; \delta_B = 10\%$
 $A_{86} = 163,6653; B_{86} = 0,64587871$

$\delta_A = 9\%; \delta_B = 0,06\%$
 $A_{87} = 1178,9524; B_{87} = 0,000735497117$
 $\delta_A = 0,06\%; \delta_B = 0,6\%$
 $A_{88} = 51292,5; B_{88} = 0,000183487446$
 $\delta_A = 0,2\%; \delta_B = 0,3\%$
 $A_{89} = 44,1588; B_{89} = 0,000331796148$
 $\delta_A = 0,09\%; \delta_B = 0,07\%$
 $A_{90} = 97831,6; B_{90} = 0,063298622$
 $\delta_A = 0,05\%; \delta_B = 0,3\%$
 $A_{91} = 65,4466; B_{91} = 0,993427$
 $\delta_A = 0,5\%; \delta_B = 0,004\%$
 $A_{92} = 28,96568; B_{92} = 0,648451592$
 $\delta_A = 0,04\%; \delta_B = 7\%$
 $A_{93} = 96362,5913; B_{93} = 0,7369649$
 $\delta_A = 0,007\%; \delta_B = 5\%$
 $A_{94} = 336,378913; B_{94} = 0,00007146348$
 $\delta_A = 0,08\%; \delta_B = 0,3\%$
 $A_{95} = 3988,142; B_{95} = 0,0055629993$
 $\delta_A = 0,001\%; \delta_B = 0,06\%$
 $A_{96} = 8927,18; B_{96} = 0,00122713119$
 $\delta_A = 0,05\%; \delta_B = 8\%$
 $A_{97} = 971727,8; B_{97} = 0,0075985979$
 $\delta_A = 0,03\%; \delta_B = 10\%$
 $A_{98} = 496642,18; B_{98} = 0,0000451847474$
 $\delta_A = 4\%; \delta_B = 0,01\%$
 $A_{99} = 681479,4; B_{99} = 0,00054368328$
 $\delta_A = 0,008\%; \delta_B = 0,009\%$
 $A_{100} = 5144,98484; B_{100} = 0,00872945$
 $\delta_A = 0,004\%; \delta_B = 0,003\%$

4 Задание IV

IV. С каким минимальным числом десятичных цифр n_F, n_Y и n_Z необходимо записать значения функций F_i, Y_i и Z_i , чтобы погрешность не превышала δ_F, δ_Y и δ_Z соответственно.

$$\begin{aligned}F_1 &= \frac{189}{740}, \delta_F \leq 0,079\% \\Y_1 &= \lg 8553, \delta_Y \leq 5,9\% \\Z_1 &= \log_9 72518, \delta_Z \leq 6,3\% \\F_2 &= \frac{293}{395}, \delta_F \leq 0,022\% \\Y_2 &= \lg 3676, \delta_Y \leq 0,17\% \\Z_2 &= 838^2, \delta_Z \leq 1,9\% \\F_3 &= \frac{693}{326}, \delta_F \leq 3,6\% \\Y_3 &= 511^2, \delta_Y \leq 9,5\% \\Z_3 &= \log_7 11434, \delta_Z \leq 0,4\% \\F_4 &= \frac{672}{695}, \delta_F \leq 0,058\% \\Y_4 &= \sin(723), \delta_Y \leq 3,8\% \\Z_4 &= \log_7 5688, \delta_Z \leq 6\% \\F_5 &= \frac{137}{50}, \delta_F \leq 4,3\% \\Y_5 &= \log_9 901, \delta_Y \leq 0,065\% \\Z_5 &= \sin(706), \delta_Z \leq 0,49\% \\F_6 &= \frac{552}{649}, \delta_F \leq 0,024\% \\Y_6 &= \lg 6601, \delta_Y \leq 0,085\% \\Z_6 &= \sin(531), \delta_Z \leq 0,55\% \\F_7 &= \frac{472}{651}, \delta_F \leq 2,4\% \\Y_7 &= \sin(918), \delta_Y \leq 0,38\% \\Z_7 &= 382^2, \delta_Z \leq 3,9\% \\F_8 &= \frac{838}{147}, \delta_F \leq 0,4\% \\Y_8 &= 130^2, \delta_Y \leq 5,9\% \\Z_8 &= \lg 4361, \delta_Z \leq 0,5\% \\F_9 &= \frac{951}{92}, \delta_F \leq 7,1\% \\Y_9 &= \lg 2274, \delta_Y \leq 0,3\% \\Z_9 &= \sqrt[2]{261,7}, \delta_Z \leq 0,078\% \\F_{10} &= \frac{679}{590}, \delta_F \leq 0,32\% \\Y_{10} &= \sqrt[6]{841,8}, \delta_Y \leq 0,053\%\end{aligned}$$

$$\begin{aligned}
Z_{10} &= \log_4 77172, \delta_Z \leq 0,051\% \\
F_{11} &= \frac{607}{429}, \delta_F \leq 0,047\% \\
Y_{11} &= \log_8 52109, \delta_Y \leq 0,7\% \\
Z_{11} &= \sin(410), \delta_Z \leq 0,31\% \\
F_{12} &= \frac{623}{46}, \delta_F \leq 0,003\% \\
Y_{12} &= 336^2, \delta_Y \leq 0,051\% \\
Z_{12} &= \log_4 98165, \delta_Z \leq 0,092\% \\
F_{13} &= \frac{290}{739}, \delta_F \leq 0,054\% \\
Y_{13} &= \sin(138), \delta_Y \leq 1\% \\
Z_{13} &= 700^2, \delta_Z \leq 0,019\% \\
F_{14} &= \frac{908}{673}, \delta_F \leq 8,4\% \\
Y_{14} &= \sin(910), \delta_Y \leq 0,08\% \\
Z_{14} &= \log_5 56948, \delta_Z \leq 0,022\% \\
F_{15} &= \frac{255}{536}, \delta_F \leq 0,057\% \\
Y_{15} &= \lg 3486, \delta_Y \leq 9,9\% \\
Z_{15} &= \sqrt[3]{402,1}, \delta_Z \leq 0,004\% \\
F_{16} &= \frac{589}{344}, \delta_F \leq 0,4\% \\
Y_{16} &= \sqrt[2]{418,7}, \delta_Y \leq 4,9\% \\
Z_{16} &= \sin(996), \delta_Z \leq 0,001\% \\
F_{17} &= \frac{38}{185}, \delta_F \leq 0,073\% \\
Y_{17} &= \sin(692), \delta_Y \leq 2,3\% \\
Z_{17} &= \lg 3099, \delta_Z \leq 3,9\% \\
F_{18} &= \frac{835}{911}, \delta_F \leq 5,7\% \\
Y_{18} &= \sin(934), \delta_Y \leq 0,12\% \\
Z_{18} &= \lg 3859, \delta_Z \leq 0,003\% \\
F_{19} &= \frac{899}{163}, \delta_F \leq 0,45\% \\
Y_{19} &= \log_4 79119, \delta_Y \leq 1,7\% \\
Z_{19} &= \lg 9921, \delta_Z \leq 8,2\% \\
F_{20} &= \frac{513}{25}, \delta_F \leq 0,7\% \\
Y_{20} &= \log_6 52357, \delta_Y \leq 0,62\% \\
Z_{20} &= \sqrt[4]{485,8}, \delta_Z \leq 8,9\% \\
F_{21} &= \frac{781}{842}, \delta_F \leq 0,033\% \\
Y_{21} &= \lg 1699, \delta_Y \leq 7\% \\
Z_{21} &= \log_5 94551, \delta_Z \leq 0,055\% \\
F_{22} &= \frac{176}{79}, \delta_F \leq 0,19\%
\end{aligned}$$

$$\begin{aligned}
Y_{22} &= \lg 2694, \delta_Y \leq 0,54\% \\
Z_{22} &= \log_9 39675, \delta_Z \leq 4\% \\
F_{23} &= \frac{437}{315}, \delta_F \leq 0,6\% \\
Y_{23} &= \sqrt[3]{634,7}, \delta_Y \leq 0,89\% \\
Z_{23} &= \log_7 33616, \delta_Z \leq 0,083\% \\
F_{24} &= \frac{913}{819}, \delta_F \leq 0,033\% \\
Y_{24} &= \sqrt[3]{521,2}, \delta_Y \leq 4,6\% \\
Z_{24} &= \sin(346), \delta_Z \leq 0,14\% \\
F_{25} &= \frac{149}{220}, \delta_F \leq 0,23\% \\
Y_{25} &= \log_8 94633, \delta_Y \leq 3\% \\
Z_{25} &= \lg 9394, \delta_Z \leq 0,062\% \\
F_{26} &= \frac{479}{51}, \delta_F \leq 0,069\% \\
Y_{26} &= 105^2, \delta_Y \leq 1,9\% \\
Z_{26} &= \sqrt[2]{291,6}, \delta_Z \leq 0,88\% \\
F_{27} &= \frac{419}{324}, \delta_F \leq 0,025\% \\
Y_{27} &= \sqrt[3]{459,8}, \delta_Y \leq 3,5\% \\
Z_{27} &= \log_3 37879, \delta_Z \leq 0,075\% \\
F_{28} &= \frac{671}{210}, \delta_F \leq 0,86\% \\
Y_{28} &= \sqrt[3]{527,6}, \delta_Y \leq 0,03\% \\
Z_{28} &= \sin(599), \delta_Z \leq 0,081\% \\
F_{29} &= \frac{545}{926}, \delta_F \leq 2,4\% \\
Y_{29} &= \log_9 53528, \delta_Y \leq 7,3\% \\
Z_{29} &= \sqrt[3]{492,8}, \delta_Z \leq 0,62\% \\
F_{30} &= \frac{731}{786}, \delta_F \leq 9,7\% \\
Y_{30} &= \log_9 94546, \delta_Y \leq 0,68\% \\
Z_{30} &= \lg 6462, \delta_Z \leq 0,086\% \\
F_{31} &= \frac{489}{683}, \delta_F \leq 0,094\% \\
Y_{31} &= \log_6 70297, \delta_Y \leq 0,52\% \\
Z_{31} &= \lg 6062, \delta_Z \leq 8,5\% \\
F_{32} &= \frac{781}{172}, \delta_F \leq 0,01\% \\
Y_{32} &= \sqrt[5]{887,4}, \delta_Y \leq 0,083\% \\
Z_{32} &= \lg 5753, \delta_Z \leq 8,7\% \\
F_{33} &= \frac{909}{977}, \delta_F \leq 0,24\% \\
Y_{33} &= \sin(761), \delta_Y \leq 9,7\% \\
Z_{33} &= \sqrt[3]{225,5}, \delta_Z \leq 0,38\%
\end{aligned}$$

$$\begin{aligned}
F_{34} &= \frac{125}{36}, \delta_F \leq 2,7\% \\
Y_{34} &= \sqrt[5]{447,4}, \delta_Y \leq 1,2\% \\
Z_{34} &= \log_5 3841, \delta_Z \leq 0,72\% \\
F_{35} &= \frac{843}{931}, \delta_F \leq 0,014\% \\
Y_{35} &= \lg 4775, \delta_Y \leq 0,059\% \\
Z_{35} &= \log_7 47035, \delta_Z \leq 0,79\% \\
F_{36} &= \frac{135}{902}, \delta_F \leq 0,002\% \\
Y_{36} &= \log_3 10547, \delta_Y \leq 0,051\% \\
Z_{36} &= \sin(904), \delta_Z \leq 0,061\% \\
F_{37} &= \frac{79}{380}, \delta_F \leq 2,4\% \\
Y_{37} &= \sqrt[4]{826,7}, \delta_Y \leq 0,086\% \\
Z_{37} &= \lg 7774, \delta_Z \leq 0,57\% \\
F_{38} &= \frac{647}{123}, \delta_F \leq 0,18\% \\
Y_{38} &= 741^2, \delta_Y \leq 0,097\% \\
Z_{38} &= \lg 3997, \delta_Z \leq 0,86\% \\
F_{39} &= \frac{319}{885}, \delta_F \leq 0,054\% \\
Y_{39} &= 134^2, \delta_Y \leq 0,63\% \\
Z_{39} &= \log_7 32978, \delta_Z \leq 8,5\% \\
F_{40} &= \frac{912}{647}, \delta_F \leq 0,68\% \\
Y_{40} &= \log_5 11421, \delta_Y \leq 0,049\% \\
Z_{40} &= \sin(475), \delta_Z \leq 0,76\% \\
F_{41} &= \frac{221}{815}, \delta_F \leq 0,51\% \\
Y_{41} &= 301^2, \delta_Y \leq 9,9\% \\
Z_{41} &= \sqrt[3]{234,9}, \delta_Z \leq 0,08\% \\
F_{42} &= \frac{995}{187}, \delta_F \leq 0,6\% \\
Y_{42} &= 681^2, \delta_Y \leq 0,063\% \\
Z_{42} &= \lg 2134, \delta_Z \leq 0,049\% \\
F_{43} &= \frac{908}{445}, \delta_F \leq 7,9\% \\
Y_{43} &= \sqrt[2]{173,6}, \delta_Y \leq 5,3\% \\
Z_{43} &= \log_6 70823, \delta_Z \leq 0,44\% \\
F_{44} &= \frac{61}{515}, \delta_F \leq 0,86\% \\
Y_{44} &= \log_9 14358, \delta_Y \leq 0,91\% \\
Z_{44} &= \sqrt[6]{544,9}, \delta_Z \leq 9,8\% \\
F_{45} &= \frac{204}{613}, \delta_F \leq 0,065\% \\
Y_{45} &= \sqrt[3]{475,8}, \delta_Y \leq 0,82\%
\end{aligned}$$

$$\begin{aligned}
Z_{45} &= 592^2, \delta_Z \leq 0,004\% \\
F_{46} &= \frac{586}{587}, \delta_F \leq 0,28\% \\
Y_{46} &= \log_8 71432, \delta_Y \leq 0,68\% \\
Z_{46} &= 515^2, \delta_Z \leq 0,42\% \\
F_{47} &= \frac{850}{607}, \delta_F \leq 9,3\% \\
Y_{47} &= \sin(428), \delta_Y \leq 0,6\% \\
Z_{47} &= \log_9 8658, \delta_Z \leq 7,1\% \\
F_{48} &= \frac{194}{517}, \delta_F \leq 4,1\% \\
Y_{48} &= \log_6 28417, \delta_Y \leq 0,65\% \\
Z_{48} &= 850^2, \delta_Z \leq 0,043\% \\
F_{49} &= \frac{120}{259}, \delta_F \leq 0,085\% \\
Y_{49} &= \sqrt[4]{513,6}, \delta_Y \leq 0,49\% \\
Z_{49} &= 945^2, \delta_Z \leq 7,2\% \\
F_{50} &= \frac{697}{771}, \delta_F \leq 6,3\% \\
Y_{50} &= \log_5 85056, \delta_Y \leq 0,2\% \\
Z_{50} &= \lg 1105, \delta_Z \leq 0,86\% \\
F_{51} &= \frac{793}{931}, \delta_F \leq 0,004\% \\
Y_{51} &= \log_4 38556, \delta_Y \leq 0,024\% \\
Z_{51} &= \sqrt[5]{388,1}, \delta_Z \leq 2,8\% \\
F_{52} &= \frac{909}{161}, \delta_F \leq 0,091\% \\
Y_{52} &= \log_6 36787, \delta_Y \leq 0,5\% \\
Z_{52} &= 135^2, \delta_Z \leq 4,4\% \\
F_{53} &= \frac{46}{863}, \delta_F \leq 0,3\% \\
Y_{53} &= \lg 8797, \delta_Y \leq 0,25\% \\
Z_{53} &= \sqrt[2]{655,9}, \delta_Z \leq 0,49\% \\
F_{54} &= \frac{376}{33}, \delta_F \leq 0,05\% \\
Y_{54} &= \lg 3243, \delta_Y \leq 0,97\% \\
Z_{54} &= \sqrt[5]{942,3}, \delta_Z \leq 8,5\% \\
F_{55} &= \frac{437}{712}, \delta_F \leq 2,7\% \\
Y_{55} &= \sin(493), \delta_Y \leq 0,13\% \\
Z_{55} &= \log_6 44168, \delta_Z \leq 0,76\% \\
F_{56} &= \frac{960}{869}, \delta_F \leq 0,083\% \\
Y_{56} &= \lg 1107, \delta_Y \leq 0,56\% \\
Z_{56} &= \log_5 20064, \delta_Z \leq 0,016\% \\
F_{57} &= \frac{466}{23}, \delta_F \leq 0,063\%
\end{aligned}$$

$$\begin{aligned}
Y_{57} &= 203^2, \delta_Y \leq 0,034\% \\
Z_{57} &= \sin(534), \delta_Z \leq 0,055\% \\
F_{58} &= \frac{149}{136}, \delta_F \leq 0,018\% \\
Y_{58} &= \sin(728), \delta_Y \leq 0,014\% \\
Z_{58} &= \lg 2805, \delta_Z \leq 0,1\% \\
F_{59} &= \frac{680}{673}, \delta_F \leq 1\% \\
Y_{59} &= \sqrt[3]{748,5}, \delta_Y \leq 0,3\% \\
Z_{59} &= \lg 3041, \delta_Z \leq 6,2\% \\
F_{60} &= \frac{389}{882}, \delta_F \leq 0,6\% \\
Y_{60} &= \sin(671), \delta_Y \leq 0,09\% \\
Z_{60} &= \lg 9157, \delta_Z \leq 0,2\% \\
F_{61} &= \frac{944}{57}, \delta_F \leq 0,11\% \\
Y_{61} &= \log_9 95398, \delta_Y \leq 6,2\% \\
Z_{61} &= \sqrt[3]{169,5}, \delta_Z \leq 3,5\% \\
F_{62} &= \frac{291}{133}, \delta_F \leq 0,016\% \\
Y_{62} &= \sqrt[2]{439,9}, \delta_Y \leq 5,6\% \\
Z_{62} &= \lg 3423, \delta_Z \leq 0,016\% \\
F_{63} &= \frac{799}{389}, \delta_F \leq 0,16\% \\
Y_{63} &= \sqrt[3]{879,2}, \delta_Y \leq 0,52\% \\
Z_{63} &= 798^2, \delta_Z \leq 4,2\% \\
F_{64} &= \frac{151}{986}, \delta_F \leq 0,9\% \\
Y_{64} &= \sin(441), \delta_Y \leq 0,014\% \\
Z_{64} &= \log_8 84835, \delta_Z \leq 0,09\% \\
F_{65} &= \frac{887}{996}, \delta_F \leq 0,72\% \\
Y_{65} &= \sqrt[7]{895,3}, \delta_Y \leq 3,4\% \\
Z_{65} &= \lg 4969, \delta_Z \leq 0,068\% \\
F_{66} &= \frac{698}{691}, \delta_F \leq 0,081\% \\
Y_{66} &= \sin(667), \delta_Y \leq 1,7\% \\
Z_{66} &= 728^2, \delta_Z \leq 5\% \\
F_{67} &= \frac{414}{835}, \delta_F \leq 1,7\% \\
Y_{67} &= 866^2, \delta_Y \leq 0,017\% \\
Z_{67} &= \lg 9419, \delta_Z \leq 0,27\% \\
F_{68} &= \frac{736}{71}, \delta_F \leq 1\% \\
Y_{68} &= \lg 4143, \delta_Y \leq 0,016\% \\
Z_{68} &= \log_6 88612, \delta_Z \leq 0,3\%
\end{aligned}$$

$$\begin{aligned}
F_{69} &= \frac{657}{139}, \delta_F \leq 0,1\% \\
Y_{69} &= \log_8 54269, \delta_Y \leq 0,85\% \\
Z_{69} &= \lg 6183, \delta_Z \leq 0,57\% \\
F_{70} &= \frac{747}{734}, \delta_F \leq 0,096\% \\
Y_{70} &= \lg 1381, \delta_Y \leq 0,53\% \\
Z_{70} &= 166^2, \delta_Z \leq 0,07\% \\
F_{71} &= \frac{515}{218}, \delta_F \leq 6,3\% \\
Y_{71} &= 422^2, \delta_Y \leq 3,4\% \\
Z_{71} &= \sin(346), \delta_Z \leq 0,59\% \\
F_{72} &= \frac{609}{838}, \delta_F \leq 0,99\% \\
Y_{72} &= \log_8 28297, \delta_Y \leq 3,1\% \\
Z_{72} &= \sqrt[2]{515,4}, \delta_Z \leq 0,93\% \\
F_{73} &= \frac{865}{843}, \delta_F \leq 3,1\% \\
Y_{73} &= \log_3 70005, \delta_Y \leq 5\% \\
Z_{73} &= \lg 1558, \delta_Z \leq 0,26\% \\
F_{74} &= \frac{723}{973}, \delta_F \leq 0,89\% \\
Y_{74} &= \lg 2557, \delta_Y \leq 0,07\% \\
Z_{74} &= 575^2, \delta_Z \leq 3,9\% \\
F_{75} &= \frac{248}{583}, \delta_F \leq 0,006\% \\
Y_{75} &= \sqrt[2]{761,6}, \delta_Y \leq 0,65\% \\
Z_{75} &= \sin(949), \delta_Z \leq 0,058\% \\
F_{76} &= \frac{955}{379}, \delta_F \leq 3,4\% \\
Y_{76} &= 937^2, \delta_Y \leq 0,26\% \\
Z_{76} &= \sqrt[6]{437,1}, \delta_Z \leq 0,11\% \\
F_{77} &= \frac{745}{193}, \delta_F \leq 0,092\% \\
Y_{77} &= \sin(805), \delta_Y \leq 0,5\% \\
Z_{77} &= \lg 5749, \delta_Z \leq 3,6\% \\
F_{78} &= \frac{634}{599}, \delta_F \leq 0,082\% \\
Y_{78} &= 473^2, \delta_Y \leq 0,86\% \\
Z_{78} &= \sqrt[4]{194,4}, \delta_Z \leq 0,53\% \\
F_{79} &= \frac{256}{655}, \delta_F \leq 0,075\% \\
Y_{79} &= \lg 5915, \delta_Y \leq 2\% \\
Z_{79} &= \log_3 50658, \delta_Z \leq 0,044\% \\
F_{80} &= \frac{910}{91}, \delta_F \leq 0,01\% \\
Y_{80} &= 673^2, \delta_Y \leq 0,001\%
\end{aligned}$$

$$\begin{aligned}
Z_{80} &= \lg 5212, \delta_Z \leq 0,96\% \\
F_{81} &= \frac{295}{446}, \delta_F \leq 0,011\% \\
Y_{81} &= \sin(779), \delta_Y \leq 2,3\% \\
Z_{81} &= \lg 3225, \delta_Z \leq 0,75\% \\
F_{82} &= \frac{875}{366}, \delta_F \leq 0,3\% \\
Y_{82} &= \sqrt[2]{772,2}, \delta_Y \leq 0,056\% \\
Z_{82} &= 122^2, \delta_Z \leq 6,1\% \\
F_{83} &= \frac{631}{226}, \delta_F \leq 9,5\% \\
Y_{83} &= \log_8 89227, \delta_Y \leq 0,51\% \\
Z_{83} &= 612^2, \delta_Z \leq 0,44\% \\
F_{84} &= \frac{241}{771}, \delta_F \leq 0,035\% \\
Y_{84} &= \log_3 6655, \delta_Y \leq 0,05\% \\
Z_{84} &= \sin(667), \delta_Z \leq 0,087\% \\
F_{85} &= \frac{6}{451}, \delta_F \leq 2,2\% \\
Y_{85} &= \log_4 23831, \delta_Y \leq 8,4\% \\
Z_{85} &= \lg 8065, \delta_Z \leq 0,23\% \\
F_{86} &= \frac{329}{493}, \delta_F \leq 0,78\% \\
Y_{86} &= \log_5 61889, \delta_Y \leq 0,07\% \\
Z_{86} &= \lg 6788, \delta_Z \leq 4,4\% \\
F_{87} &= \frac{551}{518}, \delta_F \leq 8,6\% \\
Y_{87} &= \lg 4132, \delta_Y \leq 3,9\% \\
Z_{87} &= \log_8 42906, \delta_Z \leq 3,8\% \\
F_{88} &= \frac{493}{288}, \delta_F \leq 0,014\% \\
Y_{88} &= 372^2, \delta_Y \leq 9,4\% \\
Z_{88} &= \lg 3103, \delta_Z \leq 0,035\% \\
F_{89} &= \frac{703}{379}, \delta_F \leq 0,82\% \\
Y_{89} &= \log_7 79595, \delta_Y \leq 0,091\% \\
Z_{89} &= \sqrt[2]{810,4}, \delta_Z \leq 0,24\% \\
F_{90} &= \frac{261}{221}, \delta_F \leq 6,1\% \\
Y_{90} &= \sin(142), \delta_Y \leq 8,4\% \\
Z_{90} &= \lg 3827, \delta_Z \leq 8,7\% \\
F_{91} &= \frac{890}{949}, \delta_F \leq 0,082\% \\
Y_{91} &= \lg 7884, \delta_Y \leq 5,8\% \\
Z_{91} &= \sin(963), \delta_Z \leq 5,1\% \\
F_{92} &= \frac{299}{509}, \delta_F \leq 3,6\%
\end{aligned}$$

$$\begin{aligned}
Y_{92} &= \lg 9369, \delta_Y \leq 0,066\% \\
Z_{92} &= \log_5 3283, \delta_Z \leq 7,6\% \\
F_{93} &= \frac{830}{611}, \delta_F \leq 0,38\% \\
Y_{93} &= \lg 6923, \delta_Y \leq 9,3\% \\
Z_{93} &= \sqrt[4]{408,1}, \delta_Z \leq 0,83\% \\
F_{94} &= \frac{677}{38}, \delta_F \leq 0,42\% \\
Y_{94} &= \log_5 34134, \delta_Y \leq 0,9\% \\
Z_{94} &= \sqrt[7]{300,1}, \delta_Z \leq 0,1\% \\
F_{95} &= \frac{601}{944}, \delta_F \leq 0,45\% \\
Y_{95} &= \sqrt[7]{125,6}, \delta_Y \leq 0,041\% \\
Z_{95} &= \log_4 1235, \delta_Z \leq 8,8\% \\
F_{96} &= \frac{529}{788}, \delta_F \leq 3\% \\
Y_{96} &= 991^2, \delta_Y \leq 0,041\% \\
Z_{96} &= \sqrt[2]{710,5}, \delta_Z \leq 0,6\% \\
F_{97} &= \frac{3}{287}, \delta_F \leq 0,074\% \\
Y_{97} &= \sin(897), \delta_Y \leq 0,094\% \\
Z_{97} &= 426^2, \delta_Z \leq 0,21\% \\
F_{98} &= \frac{589}{592}, \delta_F \leq 0,06\% \\
Y_{98} &= \lg 1497, \delta_Y \leq 0,019\% \\
Z_{98} &= \sqrt[2]{108,5}, \delta_Z \leq 0,09\% \\
F_{99} &= \frac{640}{211}, \delta_F \leq 0,075\% \\
Y_{99} &= \sin(219), \delta_Y \leq 2,3\% \\
Z_{99} &= \log_8 63305, \delta_Z \leq 0,012\% \\
F_{100} &= \frac{959}{820}, \delta_F \leq 0,63\% \\
Y_{100} &= \log_3 80696, \delta_Y \leq 0,97\% \\
Z_{100} &= \lg 5476, \delta_Z \leq 0,61\% \\
F_{101} &= \frac{679}{242}, \delta_F \leq 8,3\% \\
Y_{101} &= \log_9 66511, \delta_Y \leq 0,05\% \\
Z_{101} &= \lg 3981, \delta_Z \leq 2,4\%
\end{aligned}$$

5 Задание V

V. Задана функция $F = F(a, b, c, d)$. Требуется найти абсолютную и относительную погрешности вычислений этой функции в заданной точке (a, b, c, d) . Абсолютные погрешности аргументов заданы.

Решить двумя способами: используя основную формулу теории погрешностей.

с помощью метода границ.

$$F_1 = \sin(a) - c + 6^b + d$$

$$a_1 = 8,741 \pm 0,257;$$

$$b_1 = 7,316 \pm 0,205;$$

$$c_1 = 7,842 \pm 0,286;$$

$$d_1 = 7,40 \pm 0,254;$$

$$F_2 = \log_b(d) - c \times \sqrt[5]{a}$$

$$a_2 = 7,977 \pm 0,284;$$

$$b_2 = 6,386 \pm 0,272;$$

$$c_2 = 6,924 \pm 0,284;$$

$$d_2 = 7,829 \pm 0,212;$$

$$F_3 = \frac{10^{d-a}}{10^{c-b}}$$

$$a_3 = 5,966 \pm 0,297;$$

$$b_3 = 8,191 \pm 0,229;$$

$$c_3 = 6,457 \pm 0,266;$$

$$d_3 = 6,383 \pm 0,298;$$

$$F_4 = d^7 - a - b^7 - c$$

$$a_4 = 6,999 \pm 0,257;$$

$$b_4 = 7,900 \pm 0,251;$$

$$c_4 = 8,467 \pm 0,292;$$

$$d_4 = 6,648 \pm 0,261;$$

$$F_5 = \sin(b) + c \times 7^a + d$$

$$a_5 = 8,600 \pm 0,298;$$

$$b_5 = 8,556 \pm 0,273;$$

$$c_5 = 8,224 \pm 0,300;$$

$$d_5 = 5,609 \pm 0,241;$$

$$F_6 = 3^b + d \times a - c$$

$$\begin{aligned}
a_6 &= 6,488 \pm 0,221; \\
b_6 &= 8,734 \pm 0,235; \\
c_6 &= 6,316 \pm 0,267; \\
d_6 &= 7,263 \pm 0,271; \\
F_7 &= \log_c(d) - \cos(a) - b \\
a_7 &= 7,480 \pm 0,224; \\
b_7 &= 8,802 \pm 0,259; \\
c_7 &= 8,625 \pm 0,228; \\
d_7 &= 5,23 \pm 0,276; \\
F_8 &= d + b + 3^a - c \\
a_8 &= 8,624 \pm 0,242; \\
b_8 &= 6,576 \pm 0,280; \\
c_8 &= 7,302 \pm 0,300; \\
d_8 &= 7,678 \pm 0,270; \\
F_9 &= b^c \times \sin(a) - d \\
a_9 &= 8,758 \pm 0,294; \\
b_9 &= 6,882 \pm 0,217; \\
c_9 &= 6,487 \pm 0,285; \\
d_9 &= 7,625 \pm 0,274; \\
F_{10} &= \frac{d-a}{b \times \cos(c)} \\
a_{10} &= 6,589 \pm 0,233; \\
b_{10} &= 6,353 \pm 0,223; \\
c_{10} &= 8,740 \pm 0,226; \\
d_{10} &= 7,335 \pm 0,273; \\
F_{11} &= b^{10} + d \times c + a \\
a_{11} &= 7,205 \pm 0,226; \\
b_{11} &= 8,303 \pm 0,209; \\
c_{11} &= 7,247 \pm 0,250; \\
d_{11} &= 5,971 \pm 0,288; \\
F_{12} &= \sin(a) - d + c^4 + b \\
a_{12} &= 7,853 \pm 0,276; \\
b_{12} &= 5,748 \pm 0,226; \\
c_{12} &= 8,257 \pm 0,221; \\
d_{12} &= 5,955 \pm 0,288; \\
F_{13} &= a^c - \sin(d) - b
\end{aligned}$$

$$\begin{aligned}
a_{13} &= 7,259 \pm 0,220; \\
b_{13} &= 8,971 \pm 0,206; \\
c_{13} &= 6,781 \pm 0,242; \\
d_{13} &= 5,685 \pm 0,263; \\
F_{14} &= d^3 + c - \cos(b) + a \\
a_{14} &= 6,132 \pm 0,260; \\
b_{14} &= 6,113 \pm 0,209; \\
c_{14} &= 6,790 \pm 0,206; \\
d_{14} &= 8,28 \pm 0,235; \\
F_{15} &= 4^c + a - b^4 - d \\
a_{15} &= 5,679 \pm 0,287; \\
b_{15} &= 6,405 \pm 0,239; \\
c_{15} &= 5,516 \pm 0,252; \\
d_{15} &= 7,87 \pm 0,207; \\
F_{16} &= a - b \times \sin(c) + d \\
a_{16} &= 8,806 \pm 0,247; \\
b_{16} &= 7,602 \pm 0,292; \\
c_{16} &= 8,481 \pm 0,202; \\
d_{16} &= 5,630 \pm 0,276; \\
F_{17} &= b^8 - d - c \times \cos(a) \\
a_{17} &= 5,281 \pm 0,215; \\
b_{17} &= 5,373 \pm 0,269; \\
c_{17} &= 7,876 \pm 0,291; \\
d_{17} &= 5,572 \pm 0,288; \\
F_{18} &= \sin(d) + b - c - a \\
a_{18} &= 5,830 \pm 0,255; \\
b_{18} &= 7,177 \pm 0,240; \\
c_{18} &= 7,702 \pm 0,222; \\
d_{18} &= 6,590 \pm 0,236; \\
F_{19} &= a + b + c + d \\
a_{19} &= 7,599 \pm 0,220; \\
b_{19} &= 5,982 \pm 0,256; \\
c_{19} &= 5,369 \pm 0,235; \\
d_{19} &= 7,608 \pm 0,261; \\
F_{20} &= \sin(d) + a \times c \times \lg b
\end{aligned}$$

$$\begin{aligned}
a_{20} &= 8,780 \pm 0,255; \\
b_{20} &= 8,544 \pm 0,207; \\
c_{20} &= 8,899 \pm 0,202; \\
d_{20} &= 8,538 \pm 0,218; \\
F_{21} &= 10^d + a + \cos(b) + c \\
a_{21} &= 8,971 \pm 0,286; \\
b_{21} &= 6,193 \pm 0,204; \\
c_{21} &= 6,826 \pm 0,267; \\
d_{21} &= 7,582 \pm 0,244; \\
F_{22} &= \sin(b) + d \times a + c \\
a_{22} &= 7,579 \pm 0,210; \\
b_{22} &= 6,750 \pm 0,269; \\
c_{22} &= 6,81 \pm 0,266; \\
d_{22} &= 7,676 \pm 0,279; \\
F_{23} &= \frac{a \times \sin(c)}{d^5 - b} \\
a_{23} &= 7,666 \pm 0,202; \\
b_{23} &= 8,28 \pm 0,221; \\
c_{23} &= 5,253 \pm 0,261; \\
d_{23} &= 5,503 \pm 0,254; \\
F_{24} &= b \times \sqrt[10]{d} \times 10^c + a \\
a_{24} &= 8,267 \pm 0,204; \\
b_{24} &= 5,186 \pm 0,264; \\
c_{24} &= 5,827 \pm 0,297; \\
d_{24} &= 8,152 \pm 0,272; \\
F_{25} &= d^5 + c + \log_a(b) \\
a_{25} &= 5,315 \pm 0,204; \\
b_{25} &= 6,9 \pm 0,295; \\
c_{25} &= 5,455 \pm 0,277; \\
d_{25} &= 8,742 \pm 0,221; \\
F_{26} &= a \times \sqrt[8]{b} \times \sin(c) - d \\
a_{26} &= 8,556 \pm 0,257; \\
b_{26} &= 8,44 \pm 0,289; \\
c_{26} &= 8,388 \pm 0,228; \\
d_{26} &= 7,319 \pm 0,210; \\
F_{27} &= 4^b - a - \cos(d) - c
\end{aligned}$$

$$\begin{aligned}
a_{27} &= 7,760 \pm 0,230; \\
b_{27} &= 8,481 \pm 0,211; \\
c_{27} &= 8,493 \pm 0,213; \\
d_{27} &= 6,746 \pm 0,234; \\
F_{28} &= b^2 + d + a \times \cos(c) \\
a_{28} &= 6,255 \pm 0,278; \\
b_{28} &= 7,401 \pm 0,204; \\
c_{28} &= 8,393 \pm 0,246; \\
d_{28} &= 6,792 \pm 0,233; \\
F_{29} &= \frac{\cos(b)+c}{\sin(d)+a} \\
a_{29} &= 6,704 \pm 0,271; \\
b_{29} &= 6,308 \pm 0,244; \\
c_{29} &= 5,792 \pm 0,243; \\
d_{29} &= 5,469 \pm 0,293; \\
F_{30} &= \cos(a) - c \times d^7 - b \\
a_{30} &= 7,651 \pm 0,200; \\
b_{30} &= 8,83 \pm 0,277; \\
c_{30} &= 7,250 \pm 0,201; \\
d_{30} &= 8,381 \pm 0,250; \\
F_{31} &= \sin(c) + d \times \log_b(a) \\
a_{31} &= 6,778 \pm 0,264; \\
b_{31} &= 8,520 \pm 0,300; \\
c_{31} &= 6,134 \pm 0,282; \\
d_{31} &= 8,336 \pm 0,273; \\
F_{32} &= b \times \sin(c) + d^7 + a \\
a_{32} &= 5,761 \pm 0,215; \\
b_{32} &= 8,729 \pm 0,238; \\
c_{32} &= 5,451 \pm 0,276; \\
d_{32} &= 5,570 \pm 0,286; \\
F_{33} &= \log_d(a) \times c^b \\
a_{33} &= 7,620 \pm 0,231; \\
b_{33} &= 5,964 \pm 0,265; \\
c_{33} &= 7,693 \pm 0,261; \\
d_{33} &= 8,0 \pm 0,292; \\
F_{34} &= \log_b(c) \times a^6 + d
\end{aligned}$$

$$\begin{aligned}
a_{34} &= 5,123 \pm 0,298; \\
b_{34} &= 8,461 \pm 0,260; \\
c_{34} &= 7,369 \pm 0,220; \\
d_{34} &= 5,179 \pm 0,279; \\
F_{35} &= d \times \sin(b) \times \log_a(c) \\
a_{35} &= 8,47 \pm 0,257; \\
b_{35} &= 5,311 \pm 0,234; \\
c_{35} &= 6,53 \pm 0,200; \\
d_{35} &= 5,740 \pm 0,207; \\
F_{36} &= 4^d - b + \sin(a) + c \\
a_{36} &= 5,400 \pm 0,294; \\
b_{36} &= 5,154 \pm 0,227; \\
c_{36} &= 7,831 \pm 0,285; \\
d_{36} &= 6,623 \pm 0,245; \\
F_{37} &= d \times \cos(b) \times \cos(a) - c \\
a_{37} &= 5,731 \pm 0,250; \\
b_{37} &= 5,557 \pm 0,207; \\
c_{37} &= 5,170 \pm 0,297; \\
d_{37} &= 7,301 \pm 0,262; \\
F_{38} &= b \times \lg d + c + a \\
a_{38} &= 8,149 \pm 0,246; \\
b_{38} &= 8,503 \pm 0,283; \\
c_{38} &= 8,537 \pm 0,249; \\
d_{38} &= 8,651 \pm 0,207; \\
F_{39} &= \log_a(b) \times d \times \sqrt[6]{c} \\
a_{39} &= 7,97 \pm 0,219; \\
b_{39} &= 8,406 \pm 0,266; \\
c_{39} &= 6,651 \pm 0,224; \\
d_{39} &= 5,743 \pm 0,265; \\
F_{40} &= a \times \lg d \times 5^b - c \\
a_{40} &= 8,53 \pm 0,297; \\
b_{40} &= 6,146 \pm 0,274; \\
c_{40} &= 5,854 \pm 0,274; \\
d_{40} &= 8,206 \pm 0,270; \\
F_{41} &= \frac{d \times \lg c}{a+b}
\end{aligned}$$

$$\begin{aligned}
a_{41} &= 5,893 \pm 0,230; \\
b_{41} &= 8,844 \pm 0,252; \\
c_{41} &= 6,200 \pm 0,246; \\
d_{41} &= 6,325 \pm 0,249; \\
F_{42} &= a \times \cos(b) - 8^d + c \\
a_{42} &= 8,813 \pm 0,260; \\
b_{42} &= 7,476 \pm 0,211; \\
c_{42} &= 8,429 \pm 0,242; \\
d_{42} &= 7,531 \pm 0,246; \\
F_{43} &= a \times \sqrt[5]{d} - \sin(c) - b \\
a_{43} &= 8,26 \pm 0,225; \\
b_{43} &= 8,774 \pm 0,256; \\
c_{43} &= 5,546 \pm 0,214; \\
d_{43} &= 6,714 \pm 0,250; \\
F_{44} &= \frac{d \times \cos(a)}{c^b} \\
a_{44} &= 7,438 \pm 0,295; \\
b_{44} &= 8,242 \pm 0,275; \\
c_{44} &= 7,631 \pm 0,223; \\
d_{44} &= 8,781 \pm 0,283; \\
F_{45} &= a + b + \sin(c) - d \\
a_{45} &= 7,859 \pm 0,284; \\
b_{45} &= 5,172 \pm 0,206; \\
c_{45} &= 6,683 \pm 0,229; \\
d_{45} &= 8,976 \pm 0,233; \\
F_{46} &= b^c - d^3 - a \\
a_{46} &= 6,370 \pm 0,203; \\
b_{46} &= 7,359 \pm 0,271; \\
c_{46} &= 7,391 \pm 0,223; \\
d_{46} &= 7,591 \pm 0,211; \\
F_{47} &= \frac{\sin(c) - a}{d + b} \\
a_{47} &= 7,971 \pm 0,258; \\
b_{47} &= 8,174 \pm 0,289; \\
c_{47} &= 8,658 \pm 0,224; \\
d_{47} &= 7,983 \pm 0,270; \\
F_{48} &= d + a \times 10^c - b
\end{aligned}$$

$$\begin{aligned}
a_{48} &= 5,976 \pm 0,299; \\
b_{48} &= 7,189 \pm 0,282; \\
c_{48} &= 8,301 \pm 0,288; \\
d_{48} &= 5,523 \pm 0,277; \\
F_{49} &= a \times \sqrt[8]{c} \times b + d \\
a_{49} &= 7,787 \pm 0,236; \\
b_{49} &= 6,942 \pm 0,268; \\
c_{49} &= 6,815 \pm 0,206; \\
d_{49} &= 6,388 \pm 0,279; \\
F_{50} &= b + d - \sin(c) + a \\
a_{50} &= 8,454 \pm 0,237; \\
b_{50} &= 5,357 \pm 0,272; \\
c_{50} &= 5,829 \pm 0,292; \\
d_{50} &= 6,405 \pm 0,263; \\
F_{51} &= a - b - \sin(d) + c \\
a_{51} &= 5,854 \pm 0,274; \\
b_{51} &= 7,16 \pm 0,202; \\
c_{51} &= 6,945 \pm 0,234; \\
d_{51} &= 8,521 \pm 0,282; \\
F_{52} &= 10^b - a + c^{10} + d \\
a_{52} &= 8,135 \pm 0,275; \\
b_{52} &= 7,271 \pm 0,221; \\
c_{52} &= 5,877 \pm 0,205; \\
d_{52} &= 8,686 \pm 0,280; \\
F_{53} &= 6^d + b + \cos(c) + a \\
a_{53} &= 6,370 \pm 0,285; \\
b_{53} &= 5,77 \pm 0,240; \\
c_{53} &= 8,573 \pm 0,259; \\
d_{53} &= 8,731 \pm 0,244; \\
F_{54} &= c^9 - d + \log_a(b) \\
a_{54} &= 8,941 \pm 0,261; \\
b_{54} &= 6,539 \pm 0,207; \\
c_{54} &= 8,99 \pm 0,221; \\
d_{54} &= 6,726 \pm 0,300; \\
F_{55} &= 9^b - a + \sin(c) - d
\end{aligned}$$

$$\begin{aligned}
a_{55} &= 5,771 \pm 0,246; \\
b_{55} &= 7,57 \pm 0,261; \\
c_{55} &= 7,670 \pm 0,215; \\
d_{55} &= 6,148 \pm 0,216; \\
F_{56} &= d + a - c^b \\
a_{56} &= 6,655 \pm 0,278; \\
b_{56} &= 7,582 \pm 0,239; \\
c_{56} &= 7,24 \pm 0,294; \\
d_{56} &= 8,337 \pm 0,224; \\
F_{57} &= \sin(d) + b + c \times \cos(a) \\
a_{57} &= 7,429 \pm 0,212; \\
b_{57} &= 8,153 \pm 0,232; \\
c_{57} &= 7,41 \pm 0,213; \\
d_{57} &= 8,720 \pm 0,246; \\
F_{58} &= a^7 + b - \sin(d) + c \\
a_{58} &= 6,986 \pm 0,207; \\
b_{58} &= 8,140 \pm 0,282; \\
c_{58} &= 5,485 \pm 0,266; \\
d_{58} &= 8,161 \pm 0,279; \\
F_{59} &= \frac{\cos(b)-d}{a+c} \\
a_{59} &= 5,60 \pm 0,205; \\
b_{59} &= 8,309 \pm 0,295; \\
c_{59} &= 8,300 \pm 0,256; \\
d_{59} &= 5,140 \pm 0,249; \\
F_{60} &= d + a - \sin(c) - b \\
a_{60} &= 5,848 \pm 0,263; \\
b_{60} &= 5,565 \pm 0,242; \\
c_{60} &= 6,175 \pm 0,280; \\
d_{60} &= 7,147 \pm 0,291; \\
F_{61} &= a^8 + c - \sin(d) - b \\
a_{61} &= 6,881 \pm 0,215; \\
b_{61} &= 5,898 \pm 0,261; \\
c_{61} &= 7,694 \pm 0,234; \\
d_{61} &= 8,500 \pm 0,247; \\
F_{62} &= d \times \sin(a) - \log_c(b)
\end{aligned}$$

$$\begin{aligned}
a_{62} &= 5,194 \pm 0,283; \\
b_{62} &= 7,745 \pm 0,260; \\
c_{62} &= 6,149 \pm 0,206; \\
d_{62} &= 5,401 \pm 0,250; \\
F_{63} &= b^4 - c \times d + a \\
a_{63} &= 6,915 \pm 0,239; \\
b_{63} &= 6,74 \pm 0,223; \\
c_{63} &= 7,546 \pm 0,271; \\
d_{63} &= 8,233 \pm 0,228; \\
F_{64} &= \cos(a) + b - 5^d - c \\
a_{64} &= 8,857 \pm 0,274; \\
b_{64} &= 6,322 \pm 0,254; \\
c_{64} &= 7,702 \pm 0,256; \\
d_{64} &= 7,152 \pm 0,212; \\
F_{65} &= \cos(a) + d + b^c \\
a_{65} &= 5,818 \pm 0,259; \\
b_{65} &= 5,910 \pm 0,280; \\
c_{65} &= 5,728 \pm 0,220; \\
d_{65} &= 6,277 \pm 0,211; \\
F_{66} &= \sin(d) - a + \sin(c) - b \\
a_{66} &= 7,729 \pm 0,275; \\
b_{66} &= 8,769 \pm 0,226; \\
c_{66} &= 6,676 \pm 0,270; \\
d_{66} &= 6,161 \pm 0,288; \\
F_{67} &= c \times \lg b - d + a \\
a_{67} &= 7,732 \pm 0,291; \\
b_{67} &= 8,63 \pm 0,256; \\
c_{67} &= 8,740 \pm 0,286; \\
d_{67} &= 8,270 \pm 0,281; \\
F_{68} &= d \times \sqrt[3]{c} - \cos(a) + b \\
a_{68} &= 8,544 \pm 0,236; \\
b_{68} &= 5,274 \pm 0,280; \\
c_{68} &= 5,401 \pm 0,284; \\
d_{68} &= 8,828 \pm 0,230; \\
F_{69} &= c \times \sin(d) \times \cos(a) - b
\end{aligned}$$

$$\begin{aligned}
a_{69} &= 6,175 \pm 0,231; \\
b_{69} &= 5,481 \pm 0,228; \\
c_{69} &= 5,713 \pm 0,293; \\
d_{69} &= 7,806 \pm 0,241; \\
F_{70} &= c \times \sin(b) + \sin(a) - d \\
a_{70} &= 6,165 \pm 0,285; \\
b_{70} &= 6,791 \pm 0,292; \\
c_{70} &= 6,515 \pm 0,220; \\
d_{70} &= 8,388 \pm 0,273; \\
F_{71} &= a^{10} + b - d^{10} + c \\
a_{71} &= 7,336 \pm 0,226; \\
b_{71} &= 5,988 \pm 0,206; \\
c_{71} &= 6,670 \pm 0,283; \\
d_{71} &= 5,391 \pm 0,252; \\
F_{72} &= \sin(a) + c + d - b \\
a_{72} &= 8,6 \pm 0,231; \\
b_{72} &= 6,751 \pm 0,262; \\
c_{72} &= 8,228 \pm 0,268; \\
d_{72} &= 8,220 \pm 0,291; \\
F_{73} &= \log_a(d) + \sin(c) + b \\
a_{73} &= 8,301 \pm 0,275; \\
b_{73} &= 8,879 \pm 0,267; \\
c_{73} &= 8,709 \pm 0,234; \\
d_{73} &= 6,952 \pm 0,262; \\
F_{74} &= \cos(d) - a + \log_b(c) \\
a_{74} &= 7,142 \pm 0,222; \\
b_{74} &= 8,459 \pm 0,261; \\
c_{74} &= 6,301 \pm 0,261; \\
d_{74} &= 8,606 \pm 0,256; \\
F_{75} &= c \times \sin(b) \times \cos(a) - d \\
a_{75} &= 7,685 \pm 0,256; \\
b_{75} &= 6,502 \pm 0,259; \\
c_{75} &= 5,573 \pm 0,227; \\
d_{75} &= 5,811 \pm 0,208; \\
F_{76} &= \cos(d) - c + a \times \sqrt[5]{b}
\end{aligned}$$

$$\begin{aligned}
a_{76} &= 6,192 \pm 0,213; \\
b_{76} &= 8,907 \pm 0,284; \\
c_{76} &= 7,561 \pm 0,272; \\
d_{76} &= 5,251 \pm 0,208; \\
F_{77} &= 5^b + c - d^a \\
a_{77} &= 7,969 \pm 0,292; \\
b_{77} &= 8,643 \pm 0,255; \\
c_{77} &= 5,537 \pm 0,203; \\
d_{77} &= 7,911 \pm 0,223; \\
F_{78} &= b \times \lg d \times 7^a - c \\
a_{78} &= 6,205 \pm 0,280; \\
b_{78} &= 7,787 \pm 0,267; \\
c_{78} &= 6,139 \pm 0,220; \\
d_{78} &= 6,638 \pm 0,278; \\
F_{79} &= \frac{4^{d+b}}{c^a} \\
a_{79} &= 7,183 \pm 0,283; \\
b_{79} &= 5,59 \pm 0,209; \\
c_{79} &= 6,537 \pm 0,246; \\
d_{79} &= 6,923 \pm 0,278; \\
F_{80} &= d \times \sqrt[2]{b} \times \sin(c) + a \\
a_{80} &= 6,630 \pm 0,268; \\
b_{80} &= 5,413 \pm 0,252; \\
c_{80} &= 6,132 \pm 0,270; \\
d_{80} &= 6,645 \pm 0,229; \\
F_{81} &= c^7 + b + a^7 + d \\
a_{81} &= 5,684 \pm 0,261; \\
b_{81} &= 5,340 \pm 0,271; \\
c_{81} &= 7,297 \pm 0,221; \\
d_{81} &= 5,622 \pm 0,201; \\
F_{82} &= a \times \sin(d) - c^3 - b \\
a_{82} &= 6,639 \pm 0,263; \\
b_{82} &= 6,651 \pm 0,267; \\
c_{82} &= 6,576 \pm 0,216; \\
d_{82} &= 7,502 \pm 0,205; \\
F_{83} &= b^7 - a + c \times \sin(d)
\end{aligned}$$

$$\begin{aligned}
a_{83} &= 5,342 \pm 0,224; \\
b_{83} &= 6,430 \pm 0,259; \\
c_{83} &= 5,198 \pm 0,245; \\
d_{83} &= 5,405 \pm 0,271; \\
F_{84} &= \frac{\log_a(b)}{\log_c(a)} \\
a_{84} &= 7,711 \pm 0,209; \\
b_{84} &= 6,930 \pm 0,255; \\
c_{84} &= 7,448 \pm 0,218; \\
d_{84} &= 6,670 \pm 0,264; \\
F_{85} &= \cos(a) - b - \sin(d) - c \\
a_{85} &= 6,184 \pm 0,246; \\
b_{85} &= 8,746 \pm 0,294; \\
c_{85} &= 5,197 \pm 0,282; \\
d_{85} &= 8,398 \pm 0,202; \\
F_{86} &= d^a + c^b \\
a_{86} &= 7,799 \pm 0,277; \\
b_{86} &= 8,253 \pm 0,221; \\
c_{86} &= 5,785 \pm 0,281; \\
d_{86} &= 5,593 \pm 0,294; \\
F_{87} &= d \times \lg a \times c \times \cos(b) \\
a_{87} &= 7,91 \pm 0,203; \\
b_{87} &= 7,851 \pm 0,298; \\
c_{87} &= 8,852 \pm 0,200; \\
d_{87} &= 7,589 \pm 0,222; \\
F_{88} &= b + a \times 9^d - c \\
a_{88} &= 7,787 \pm 0,234; \\
b_{88} &= 8,430 \pm 0,248; \\
c_{88} &= 8,407 \pm 0,256; \\
d_{88} &= 7,205 \pm 0,202; \\
F_{89} &= \sin(b) - a \times d + c \\
a_{89} &= 6,413 \pm 0,207; \\
b_{89} &= 5,92 \pm 0,239; \\
c_{89} &= 8,807 \pm 0,295; \\
d_{89} &= 8,547 \pm 0,208; \\
F_{90} &= c^a + d^3 + b
\end{aligned}$$

$$\begin{aligned}
a_{90} &= 5,683 \pm 0,300; \\
b_{90} &= 8,756 \pm 0,205; \\
c_{90} &= 7,668 \pm 0,267; \\
d_{90} &= 8,184 \pm 0,252; \\
F_{91} &= \frac{\log_a(b)}{c^6+a} \\
a_{91} &= 8,140 \pm 0,224; \\
b_{91} &= 8,755 \pm 0,243; \\
c_{91} &= 5,445 \pm 0,243; \\
d_{91} &= 6,650 \pm 0,283; \\
F_{92} &= b \times \sin(c) + d - a \\
a_{92} &= 7,633 \pm 0,291; \\
b_{92} &= 6,636 \pm 0,293; \\
c_{92} &= 8,906 \pm 0,271; \\
d_{92} &= 6,620 \pm 0,277; \\
F_{93} &= \frac{c^b}{2^a-d} \\
a_{93} &= 7,199 \pm 0,276; \\
b_{93} &= 7,465 \pm 0,282; \\
c_{93} &= 7,78 \pm 0,295; \\
d_{93} &= 5,848 \pm 0,216; \\
F_{94} &= \cos(c) - b + d \times \cos(a) \\
a_{94} &= 7,306 \pm 0,201; \\
b_{94} &= 8,473 \pm 0,201; \\
c_{94} &= 7,336 \pm 0,275; \\
d_{94} &= 5,188 \pm 0,205; \\
F_{95} &= \frac{b+c}{6^d+a} \\
a_{95} &= 7,760 \pm 0,259; \\
b_{95} &= 8,646 \pm 0,268; \\
c_{95} &= 5,526 \pm 0,255; \\
d_{95} &= 7,649 \pm 0,277; \\
F_{96} &= 4^d + c \times b + a \\
a_{96} &= 6,924 \pm 0,286; \\
b_{96} &= 5,802 \pm 0,217; \\
c_{96} &= 8,580 \pm 0,217; \\
d_{96} &= 5,708 \pm 0,265; \\
F_{97} &= \cos(c) - d \times \sin(a) + b
\end{aligned}$$

$$\begin{aligned}
a_{97} &= 6,908 \pm 0,212; \\
b_{97} &= 5,739 \pm 0,219; \\
c_{97} &= 6,872 \pm 0,276; \\
d_{97} &= 6,772 \pm 0,237; \\
F_{98} &= c \times \cos(d) \times a \times \sin(b) \\
a_{98} &= 5,585 \pm 0,237; \\
b_{98} &= 6,653 \pm 0,209; \\
c_{98} &= 8,388 \pm 0,278; \\
d_{98} &= 7,866 \pm 0,279; \\
F_{99} &= \sin(a) + c - b \times \cos(d) \\
a_{99} &= 6,86 \pm 0,288; \\
b_{99} &= 6,763 \pm 0,243; \\
c_{99} &= 5,667 \pm 0,267; \\
d_{99} &= 7,213 \pm 0,261; \\
F_{100} &= c^3 + b \times d^a \\
a_{100} &= 5,985 \pm 0,201; \\
b_{100} &= 7,608 \pm 0,266; \\
c_{100} &= 5,401 \pm 0,280; \\
d_{100} &= 5,347 \pm 0,253; \\
F_{101} &= \frac{\log_a(b)}{d^c + c} \\
a_{101} &= 5,779 \pm 0,231; \\
b_{101} &= 8,751 \pm 0,272; \\
c_{101} &= 5,498 \pm 0,273; \\
d_{101} &= 7,306 \pm 0,253;
\end{aligned}$$

6 Задание VI

VI. Задана функция $F = F(a, b, c, d)$. С какой минимальной точностью следует задать аргументы, чтобы при вычислении функции F в точке (a, b, c, d) относительная погрешность не превосходила δ_1 .

$$F_1 = \sin(a) - c + 6^b + d$$

$$a_1 = 8,741; b_1 = 7,316; c_1 = 7,842; d_1 = 7,40; \delta_F = 0,05\%;$$

$$F_2 = \log_b(d) - c \times \sqrt[5]{a}$$

$$a_2 = 7,977;$$

$$b_2 = 6,386;$$

$$c_2 = 6,924;$$

$$d_2 = 7,829;$$

$$\delta_F = 0,04\%;$$

$$F_3 = \frac{10^d - a}{10^c - b}$$

$$a_3 = 5,966;$$

$$b_3 = 8,191;$$

$$c_3 = 6,457;$$

$$d_3 = 6,383;$$

$$\delta_F = 0,08\%;$$

$$F_4 = d^7 - a - b^7 - c$$

$$a_4 = 6,999;$$

$$b_4 = 7,900;$$

$$c_4 = 8,467;$$

$$d_4 = 6,648;$$

$$\delta_F = 0,01\%;$$

$$F_5 = \sin(b) + c \times 7^a + d$$

$$a_5 = 8,600;$$

$$b_5 = 8,556;$$

$$c_5 = 8,224;$$

$$d_5 = 5,609;$$

$$\delta_F = 0,01\%;$$

$$F_6 = 3^b + d \times a - c$$

$$a_6 = 6,488;$$

$$b_6 = 8,734;$$

$$\begin{aligned}
c_6 &= 6,316; \\
d_6 &= 7,263; \\
\delta_F &= 0,01\%; \\
F_7 &= \log_c(d) - \cos(a) - b \\
a_7 &= 7,480; \\
b_7 &= 8,802; \\
c_7 &= 8,625; \\
d_7 &= 5,23; \\
\delta_F &= 0,07\%; \\
F_8 &= d + b + 3^a - c \\
a_8 &= 8,624; \\
b_8 &= 6,576; \\
c_8 &= 7,302; \\
d_8 &= 7,678; \\
\delta_F &= 0,06\%; \\
F_9 &= b^c \times \sin(a) - d \\
a_9 &= 8,758; \\
b_9 &= 6,882; \\
c_9 &= 6,487; \\
d_9 &= 7,625; \\
\delta_F &= 0,06\%; \\
F_{10} &= \frac{d-a}{b \times \cos(c)} \\
a_{10} &= 6,589; \\
b_{10} &= 6,353; \\
c_{10} &= 8,740; \\
d_{10} &= 7,335; \\
\delta_F &= 0,01\%; \\
F_{11} &= b^{10} + d \times c + a \\
a_{11} &= 7,205; \\
b_{11} &= 8,303; \\
c_{11} &= 7,247; \\
d_{11} &= 5,971; \\
\delta_F &= 0,06\%; \\
F_{12} &= \sin(a) - d + c^4 + b \\
a_{12} &= 7,853;
\end{aligned}$$

$$\begin{aligned}
b_{12} &= 5,748; \\
c_{12} &= 8,257; \\
d_{12} &= 5,955; \\
\delta_F &= 0,05\%; \\
F_{13} &= a^c - \sin(d) - b \\
a_{13} &= 7,259; \\
b_{13} &= 8,971; \\
c_{13} &= 6,781; \\
d_{13} &= 5,685; \\
\delta_F &= 0,01\%; \\
F_{14} &= d^3 + c - \cos(b) + a \\
a_{14} &= 6,132; \\
b_{14} &= 6,113; \\
c_{14} &= 6,790; \\
d_{14} &= 8,28; \\
\delta_F &= 0,01\%; \\
F_{15} &= 4^c + a - b^4 - d \\
a_{15} &= 5,679; \\
b_{15} &= 6,405; \\
c_{15} &= 5,516; \\
d_{15} &= 7,87; \\
\delta_F &= 0,09\%; \\
F_{16} &= a - b \times \sin(c) + d \\
a_{16} &= 8,806; \\
b_{16} &= 7,602; \\
c_{16} &= 8,481; \\
d_{16} &= 5,630; \\
\delta_F &= 0,08\%; \\
F_{17} &= b^8 - d - c \times \cos(a) \\
a_{17} &= 5,281; \\
b_{17} &= 5,373; \\
c_{17} &= 7,876; \\
d_{17} &= 5,572; \\
\delta_F &= 0,06\%; \\
F_{18} &= \sin(d) + b - c - a
\end{aligned}$$

$$\begin{aligned}
a_{18} &= 5,830; \\
b_{18} &= 7,177; \\
c_{18} &= 7,702; \\
d_{18} &= 6,590; \\
\delta_F &= 0,05\%; \\
F_{19} &= a + b + c + d \\
a_{19} &= 7,599; \\
b_{19} &= 5,982; \\
c_{19} &= 5,369; \\
d_{19} &= 7,608; \\
\delta_F &= 0,09\%; \\
F_{20} &= \sin(d) + a \times c \times \lg b \\
a_{20} &= 8,780; \\
b_{20} &= 8,544; \\
c_{20} &= 8,899; \\
d_{20} &= 8,538; \\
\delta_F &= 0,02\%; \\
F_{21} &= 10^d + a + \cos(b) + c \\
a_{21} &= 8,971; \\
b_{21} &= 6,193; \\
c_{21} &= 6,826; \\
d_{21} &= 7,582; \\
\delta_F &= 0,07\%; \\
F_{22} &= \sin(b) + d \times a + c \\
a_{22} &= 7,579; \\
b_{22} &= 6,750; \\
c_{22} &= 6,81; \\
d_{22} &= 7,676; \\
\delta_F &= 0,04\%; \\
F_{23} &= \frac{a \times \sin(c)}{d^5 - b} \\
a_{23} &= 7,666; \\
b_{23} &= 8,28; \\
c_{23} &= 5,253; \\
d_{23} &= 5,503; \\
\delta_F &= 0,04\%;
\end{aligned}$$

$$\begin{aligned}
F_{24} &= b \times \sqrt[10]{d} \times 10^c + a \\
a_{24} &= 8,267; \\
b_{24} &= 5,186; \\
c_{24} &= 5,827; \\
d_{24} &= 8,152; \\
\delta_F &= 0,05\%; \\
F_{25} &= d^5 + c + \log_a(b) \\
a_{25} &= 5,315; \\
b_{25} &= 6,9; \\
c_{25} &= 5,455; \\
d_{25} &= 8,742; \\
\delta_F &= 0,06\%; \\
F_{26} &= a \times \sqrt[8]{b} \times \sin(c) - d \\
a_{26} &= 8,556; \\
b_{26} &= 8,44; \\
c_{26} &= 8,388; \\
d_{26} &= 7,319; \\
\delta_F &= 0,08\%; \\
F_{27} &= 4^b - a - \cos(d) - c \\
a_{27} &= 7,760; \\
b_{27} &= 8,481; \\
c_{27} &= 8,493; \\
d_{27} &= 6,746; \\
\delta_F &= 0,01\%; \\
F_{28} &= b^2 + d + a \times \cos(c) \\
a_{28} &= 6,255; \\
b_{28} &= 7,401; \\
c_{28} &= 8,393; \\
d_{28} &= 6,792; \\
\delta_F &= 0,06\%; \\
F_{29} &= \frac{\cos(b)+c}{\sin(d)+a} \\
a_{29} &= 6,704; \\
b_{29} &= 6,308; \\
c_{29} &= 5,792; \\
d_{29} &= 5,469;
\end{aligned}$$

$$\begin{aligned}
\delta_F &= 0,06\%; \\
F_{30} &= \cos(a) - c \times d^7 - b \\
a_{30} &= 7,651; \\
b_{30} &= 8,83; \\
c_{30} &= 7,250; \\
d_{30} &= 8,381; \\
\delta_F &= 0,05\%; \\
F_{31} &= \sin(c) + d \times \log_b(a) \\
a_{31} &= 6,778; \\
b_{31} &= 8,520; \\
c_{31} &= 6,134; \\
d_{31} &= 8,336; \\
\delta_F &= 0,02\%; \\
F_{32} &= b \times \sin(c) + d^7 + a \\
a_{32} &= 5,761; \\
b_{32} &= 8,729; \\
c_{32} &= 5,451; \\
d_{32} &= 5,570; \\
\delta_F &= 0,08\%; \\
F_{33} &= \log_d(a) \times c^b \\
a_{33} &= 7,620; \\
b_{33} &= 5,964; \\
c_{33} &= 7,693; \\
d_{33} &= 8,0; \\
\delta_F &= 0,01\%; \\
F_{34} &= \log_b(c) \times a^6 + d \\
a_{34} &= 5,123; \\
b_{34} &= 8,461; \\
c_{34} &= 7,369; \\
d_{34} &= 5,179; \\
\delta_F &= 0,07\%; \\
F_{35} &= d \times \sin(b) \times \log_a(c) \\
a_{35} &= 8,47; \\
b_{35} &= 5,311; \\
c_{35} &= 6,53;
\end{aligned}$$

$$\begin{aligned}
d_{35} &= 5,740; \\
\delta_F &= 0,03\%; \\
F_{36} &= 4^d - b + \sin(a) + c \\
a_{36} &= 5,400; \\
b_{36} &= 5,154; \\
c_{36} &= 7,831; \\
d_{36} &= 6,623; \\
\delta_F &= 0,04\%; \\
F_{37} &= d \times \cos(b) \times \cos(a) - c \\
a_{37} &= 5,731; \\
b_{37} &= 5,557; \\
c_{37} &= 5,170; \\
d_{37} &= 7,301; \\
\delta_F &= 0,05\%; \\
F_{38} &= b \times \lg d + c + a \\
a_{38} &= 8,149; \\
b_{38} &= 8,503; \\
c_{38} &= 8,537; \\
d_{38} &= 8,651; \\
\delta_F &= 0,07\%; \\
F_{39} &= \log_a(b) \times d \times \sqrt[6]{c} \\
a_{39} &= 7,97; \\
b_{39} &= 8,406; \\
c_{39} &= 6,651; \\
d_{39} &= 5,743; \\
\delta_F &= 0,08\%; \\
F_{40} &= a \times \lg d \times 5^b - c \\
a_{40} &= 8,53; \\
b_{40} &= 6,146; \\
c_{40} &= 5,854; \\
d_{40} &= 8,206; \\
\delta_F &= 0,03\%; \\
F_{41} &= \frac{d \times \lg c}{a+b} \\
a_{41} &= 5,893; \\
b_{41} &= 8,844;
\end{aligned}$$

$$\begin{aligned}
c_{41} &= 6,200; \\
d_{41} &= 6,325; \\
\delta_F &= 0,08\%; \\
F_{42} &= a \times \cos(b) - 8^d + c \\
a_{42} &= 8,813; \\
b_{42} &= 7,476; \\
c_{42} &= 8,429; \\
d_{42} &= 7,531; \\
\delta_F &= 0,02\%; \\
F_{43} &= a \times \sqrt[5]{d} - \sin(c) - b \\
a_{43} &= 8,26; \\
b_{43} &= 8,774; \\
c_{43} &= 5,546; \\
d_{43} &= 6,714; \\
\delta_F &= 0,01\%; \\
F_{44} &= \frac{d \times \cos(a)}{c^b} \\
a_{44} &= 7,438; \\
b_{44} &= 8,242; \\
c_{44} &= 7,631; \\
d_{44} &= 8,781; \\
\delta_F &= 0,06\%; \\
F_{45} &= a + b + \sin(c) - d \\
a_{45} &= 7,859; \\
b_{45} &= 5,172; \\
c_{45} &= 6,683; \\
d_{45} &= 8,976; \\
\delta_F &= 0,04\%; \\
F_{46} &= b^c - d^3 - a \\
a_{46} &= 6,370; \\
b_{46} &= 7,359; \\
c_{46} &= 7,391; \\
d_{46} &= 7,591; \\
\delta_F &= 0,02\%; \\
F_{47} &= \frac{\sin(c) - a}{d + b} \\
a_{47} &= 7,971;
\end{aligned}$$

$$\begin{aligned}
b_{47} &= 8,174; \\
c_{47} &= 8,658; \\
d_{47} &= 7,983; \\
\delta_F &= 0,01\%; \\
F_{48} &= d + a \times 10^c - b \\
a_{48} &= 5,976; \\
b_{48} &= 7,189; \\
c_{48} &= 8,301; \\
d_{48} &= 5,523; \\
\delta_F &= 0,02\%; \\
F_{49} &= a \times \sqrt[8]{c} \times b + d \\
a_{49} &= 7,787; \\
b_{49} &= 6,942; \\
c_{49} &= 6,815; \\
d_{49} &= 6,388; \\
\delta_F &= 0,07\%; \\
F_{50} &= b + d - \sin(c) + a \\
a_{50} &= 8,454; \\
b_{50} &= 5,357; \\
c_{50} &= 5,829; \\
d_{50} &= 6,405; \\
\delta_F &= 0,08\%; \\
F_{51} &= a - b - \sin(d) + c \\
a_{51} &= 5,854; \\
b_{51} &= 7,16; \\
c_{51} &= 6,945; \\
d_{51} &= 8,521; \\
\delta_F &= 0,01\%; \\
F_{52} &= 10^b - a + c^{10} + d \\
a_{52} &= 8,135; \\
b_{52} &= 7,271; \\
c_{52} &= 5,877; \\
d_{52} &= 8,686; \\
\delta_F &= 0,05\%; \\
F_{53} &= 6^d + b + \cos(c) + a
\end{aligned}$$

$$\begin{aligned}
a_{53} &= 6,370; \\
b_{53} &= 5,77; \\
c_{53} &= 8,573; \\
d_{53} &= 8,731; \\
\delta_F &= 0,08\%; \\
F_{54} &= c^9 - d + \log_a(b) \\
a_{54} &= 8,941; \\
b_{54} &= 6,539; \\
c_{54} &= 8,99; \\
d_{54} &= 6,726; \\
\delta_F &= 0,09\%; \\
F_{55} &= 9^b - a + \sin(c) - d \\
a_{55} &= 5,771; \\
b_{55} &= 7,57; \\
c_{55} &= 7,670; \\
d_{55} &= 6,148; \\
\delta_F &= 0,06\%; \\
F_{56} &= d + a - c^b \\
a_{56} &= 6,655; \\
b_{56} &= 7,582; \\
c_{56} &= 7,24; \\
d_{56} &= 8,337; \\
\delta_F &= 0,03\%; \\
F_{57} &= \sin(d) + b + c \times \cos(a) \\
a_{57} &= 7,429; \\
b_{57} &= 8,153; \\
c_{57} &= 7,41; \\
d_{57} &= 8,720; \\
\delta_F &= 0,02\%; \\
F_{58} &= a^7 + b - \sin(d) + c \\
a_{58} &= 6,986; \\
b_{58} &= 8,140; \\
c_{58} &= 5,485; \\
d_{58} &= 8,161; \\
\delta_F &= 0,09\%;
\end{aligned}$$

$$F_{59} = \frac{\cos(b)-d}{a+c}$$

$$a_{59} = 5,60;$$

$$b_{59} = 8,309;$$

$$c_{59} = 8,300;$$

$$d_{59} = 5,140;$$

$$\delta_F = 0,08\%;$$

$$F_{60} = d + a - \sin(c) - b$$

$$a_{60} = 5,848;$$

$$b_{60} = 5,565;$$

$$c_{60} = 6,175;$$

$$d_{60} = 7,147;$$

$$\delta_F = 0,04\%;$$

$$F_{61} = a^8 + c - \sin(d) - b$$

$$a_{61} = 6,881;$$

$$b_{61} = 5,898;$$

$$c_{61} = 7,694;$$

$$d_{61} = 8,500;$$

$$\delta_F = 0,02\%;$$

$$F_{62} = d \times \sin(a) - \log_c(b)$$

$$a_{62} = 5,194;$$

$$b_{62} = 7,745;$$

$$c_{62} = 6,149;$$

$$d_{62} = 5,401;$$

$$\delta_F = 0,05\%;$$

$$F_{63} = b^4 - c \times d + a$$

$$a_{63} = 6,915;$$

$$b_{63} = 6,74;$$

$$c_{63} = 7,546;$$

$$d_{63} = 8,233;$$

$$\delta_F = 0,09\%;$$

$$F_{64} = \cos(a) + b - 5^d - c$$

$$a_{64} = 8,857;$$

$$b_{64} = 6,322;$$

$$c_{64} = 7,702;$$

$$d_{64} = 7,152;$$

$$\begin{aligned}
&\delta_F = 0,01\%; \\
&F_{65} = \cos(a) + d + b^c \\
&a_{65} = 5,818; \\
&b_{65} = 5,910; \\
&c_{65} = 5,728; \\
&d_{65} = 6,277; \\
&\delta_F = 0,01\%; \\
&F_{66} = \sin(d) - a + \sin(c) - b \\
&a_{66} = 7,729; \\
&b_{66} = 8,769; \\
&c_{66} = 6,676; \\
&d_{66} = 6,161; \\
&\delta_F = 0,02\%; \\
&F_{67} = c \times \lg b - d + a \\
&a_{67} = 7,732; \\
&b_{67} = 8,63; \\
&c_{67} = 8,740; \\
&d_{67} = 8,270; \\
&\delta_F = 0,04\%; \\
&F_{68} = d \times \sqrt[3]{c} - \cos(a) + b \\
&a_{68} = 8,544; \\
&b_{68} = 5,274; \\
&c_{68} = 5,401; \\
&d_{68} = 8,828; \\
&\delta_F = 0,05\%; \\
&F_{69} = c \times \sin(d) \times \cos(a) - b \\
&a_{69} = 6,175; \\
&b_{69} = 5,481; \\
&c_{69} = 5,713; \\
&d_{69} = 7,806; \\
&\delta_F = 0,08\%; \\
&F_{70} = c \times \sin(b) + \sin(a) - d \\
&a_{70} = 6,165; \\
&b_{70} = 6,791; \\
&c_{70} = 6,515;
\end{aligned}$$

$$\begin{aligned}
d_{70} &= 8,388; \\
\delta_F &= 0,04\%; \\
F_{71} &= a^{10} + b - d^{10} + c \\
a_{71} &= 7,336; \\
b_{71} &= 5,988; \\
c_{71} &= 6,670; \\
d_{71} &= 5,391; \\
\delta_F &= 0,03\%; \\
F_{72} &= \sin(a) + c + d - b \\
a_{72} &= 8,6; \\
b_{72} &= 6,751; \\
c_{72} &= 8,228; \\
d_{72} &= 8,220; \\
\delta_F &= 0,03\%; \\
F_{73} &= \log_a(d) + \sin(c) + b \\
a_{73} &= 8,301; \\
b_{73} &= 8,879; \\
c_{73} &= 8,709; \\
d_{73} &= 6,952; \\
\delta_F &= 0,02\%; \\
F_{74} &= \cos(d) - a + \log_b(c) \\
a_{74} &= 7,142; \\
b_{74} &= 8,459; \\
c_{74} &= 6,301; \\
d_{74} &= 8,606; \\
\delta_F &= 0,05\%; \\
F_{75} &= c \times \sin(b) \times \cos(a) - d \\
a_{75} &= 7,685; \\
b_{75} &= 6,502; \\
c_{75} &= 5,573; \\
d_{75} &= 5,811; \\
\delta_F &= 0,02\%; \\
F_{76} &= \cos(d) - c + a \times \sqrt[5]{b} \\
a_{76} &= 6,192; \\
b_{76} &= 8,907;
\end{aligned}$$

$$\begin{aligned}
c_{76} &= 7,561; \\
d_{76} &= 5,251; \\
\delta_F &= 0,09\%; \\
F_{77} &= 5^b + c - d^a \\
a_{77} &= 7,969; \\
b_{77} &= 8,643; \\
c_{77} &= 5,537; \\
d_{77} &= 7,911; \\
\delta_F &= 0,09\%; \\
F_{78} &= b \times \lg d \times 7^a - c \\
a_{78} &= 6,205; \\
b_{78} &= 7,787; \\
c_{78} &= 6,139; \\
d_{78} &= 6,638; \\
\delta_F &= 0,03\%; \\
F_{79} &= \frac{4^d + b}{c^a} \\
a_{79} &= 7,183; \\
b_{79} &= 5,59; \\
c_{79} &= 6,537; \\
d_{79} &= 6,923; \\
\delta_F &= 0,08\%; \\
F_{80} &= d \times \sqrt[2]{b} \times \sin(c) + a \\
a_{80} &= 6,630; \\
b_{80} &= 5,413; \\
c_{80} &= 6,132; \\
d_{80} &= 6,645; \\
\delta_F &= 0,08\%; \\
F_{81} &= c^7 + b + a^7 + d \\
a_{81} &= 5,684; \\
b_{81} &= 5,340; \\
c_{81} &= 7,297; \\
d_{81} &= 5,622; \\
\delta_F &= 0,01\%; \\
F_{82} &= a \times \sin(d) - c^3 - b \\
a_{82} &= 6,639;
\end{aligned}$$

$$\begin{aligned}
b_{82} &= 6,651; \\
c_{82} &= 6,576; \\
d_{82} &= 7,502; \\
\delta_F &= 0,01\%; \\
F_{83} &= b^7 - a + c \times \sin(d) \\
a_{83} &= 5,342; \\
b_{83} &= 6,430; \\
c_{83} &= 5,198; \\
d_{83} &= 5,405; \\
\delta_F &= 0,06\%; \\
F_{84} &= \frac{\log_a(b)}{\log_c(a)} \\
a_{84} &= 7,711; \\
b_{84} &= 6,930; \\
c_{84} &= 7,448; \\
d_{84} &= 6,670; \\
\delta_F &= 0,01\%; \\
F_{85} &= \cos(a) - b - \sin(d) - c \\
a_{85} &= 6,184; \\
b_{85} &= 8,746; \\
c_{85} &= 5,197; \\
d_{85} &= 8,398; \\
\delta_F &= 0,06\%; \\
F_{86} &= d^a + c^b \\
a_{86} &= 7,799; \\
b_{86} &= 8,253; \\
c_{86} &= 5,785; \\
d_{86} &= 5,593; \\
\delta_F &= 0,09\%; \\
F_{87} &= d \times \lg a \times c \times \cos(b) \\
a_{87} &= 7,91; \\
b_{87} &= 7,851; \\
c_{87} &= 8,852; \\
d_{87} &= 7,589; \\
\delta_F &= 0,07\%; \\
F_{88} &= b + a \times 9^d - c
\end{aligned}$$

$$\begin{aligned}
a_{88} &= 7,787; \\
b_{88} &= 8,430; \\
c_{88} &= 8,407; \\
d_{88} &= 7,205; \\
\delta_F &= 0,01\%; \\
F_{89} &= \sin(b) - a \times d + c \\
a_{89} &= 6,413; \\
b_{89} &= 5,92; \\
c_{89} &= 8,807; \\
d_{89} &= 8,547; \\
\delta_F &= 0,06\%; \\
F_{90} &= c^a + d^3 + b \\
a_{90} &= 5,683; \\
b_{90} &= 8,756; \\
c_{90} &= 7,668; \\
d_{90} &= 8,184; \\
\delta_F &= 0,06\%; \\
F_{91} &= \frac{\log_a(b)}{c^b + a} \\
a_{91} &= 8,140; \\
b_{91} &= 8,755; \\
c_{91} &= 5,445; \\
d_{91} &= 6,650; \\
\delta_F &= 0,08\%; \\
F_{92} &= b \times \sin(c) + d - a \\
a_{92} &= 7,633; \\
b_{92} &= 6,636; \\
c_{92} &= 8,906; \\
d_{92} &= 6,620; \\
\delta_F &= 0,02\%; \\
F_{93} &= \frac{c^b}{2^a - d} \\
a_{93} &= 7,199; \\
b_{93} &= 7,465; \\
c_{93} &= 7,78; \\
d_{93} &= 5,848; \\
\delta_F &= 0,09\%;
\end{aligned}$$

$$F_{94} = \cos(c) - b + d \times \cos(a)$$

$$a_{94} = 7,306;$$

$$b_{94} = 8,473;$$

$$c_{94} = 7,336;$$

$$d_{94} = 5,188;$$

$$\delta_F = 0,01\%;$$

$$F_{95} = \frac{b+c}{6^d+a}$$

$$a_{95} = 7,760;$$

$$b_{95} = 8,646;$$

$$c_{95} = 5,526;$$

$$d_{95} = 7,649;$$

$$\delta_F = 0,08\%;$$

$$F_{96} = 4^d + c \times b + a$$

$$a_{96} = 6,924;$$

$$b_{96} = 5,802;$$

$$c_{96} = 8,580;$$

$$d_{96} = 5,708;$$

$$\delta_F = 0,02\%;$$

$$F_{97} = \cos(c) - d \times \sin(a) + b$$

$$a_{97} = 6,908;$$

$$b_{97} = 5,739;$$

$$c_{97} = 6,872;$$

$$d_{97} = 6,772;$$

$$\delta_F = 0,04\%;$$

$$F_{98} = c \times \cos(d) \times a \times \sin(b)$$

$$a_{98} = 5,585;$$

$$b_{98} = 6,653;$$

$$c_{98} = 8,388;$$

$$d_{98} = 7,866;$$

$$\delta_F = 0,03\%;$$

$$F_{99} = \sin(a) + c - b \times \cos(d)$$

$$a_{99} = 6,86;$$

$$b_{99} = 6,763;$$

$$c_{99} = 5,667;$$

$$d_{99} = 7,213;$$

$$\delta_F = 0,07\%;$$

$$F_{100} = c^3 + b \times d^a$$

$$a_{100} = 5,985;$$

$$b_{100} = 7,608;$$

$$c_{100} = 5,401;$$

$$d_{100} = 5,347;$$

$$\delta_F = 0,05\%;$$

$$F_{101} = \frac{\log_a(b)}{d^r + c}$$

$$a_{101} = 5,779;$$

$$b_{101} = 8,751;$$

$$c_{101} = 5,498;$$

$$d_{101} = 7,306;$$

$$\delta_F = 0,03\%;$$

7 Задание VII

VII. Найти аналитический вид функции по её значениям, представленным в таблице. Для определения значений параметров использовать следующие методы: метод выбранных точек, метод средних и метод наименьших квадратов.

| x | F_1 | F_2 | F_3 | F_4 | F_5 |
|-------|-------|-------|-------|-------|--------|
| 1,200 | 1,042 | 0,650 | 0,958 | 0,126 | 7,107 |
| 1,300 | 1,091 | 0,620 | 1,021 | 0,126 | 7,392 |
| 1,500 | 1,196 | 0,568 | 1,158 | 0,126 | 7,929 |
| 1,700 | 1,312 | 0,524 | 1,313 | 0,126 | 8,430 |
| 1,900 | 1,438 | 0,486 | 1,490 | 0,126 | 8,902 |
| 2,200 | 1,651 | 0,439 | 1,799 | 0,126 | 9,565 |
| 2,500 | 1,895 | 0,400 | 2,174 | 0,125 | 10,184 |
| 2,800 | 2,175 | 0,367 | 2,626 | 0,125 | 10,765 |
| 3,100 | 2,497 | 0,340 | 3,172 | 0,125 | 11,316 |
| 3,500 | 3,002 | 0,309 | 4,082 | 0,125 | 12,009 |
| 3,900 | 3,608 | 0,283 | 5,251 | 0,125 | 12,663 |
| 4,300 | 4,337 | 0,261 | 6,756 | 0,125 | 13,284 |

| x | F_6 | F_7 | F_8 | F_9 | F_{10} |
|-------|----------|---------|-------|-------|----------|
| 1,200 | 157,248 | 420,183 | 4,223 | 0,156 | 1660,021 |
| 1,300 | 199,927 | 429,363 | 4,155 | 0,159 | 1722,454 |
| 1,500 | 307,125 | 446,277 | 4,024 | 0,165 | 1834,073 |
| 1,700 | 447,083 | 461,616 | 3,902 | 0,170 | 1931,700 |
| 1,900 | 624,169 | 475,689 | 3,786 | 0,175 | 2018,456 |
| 2,200 | 968,968 | 494,896 | 3,626 | 0,181 | 2132,807 |
| 2,500 | 1421,875 | 512,276 | 3,478 | 0,187 | 2232,517 |
| 2,800 | 1997,632 | 528,193 | 3,342 | 0,191 | 2320,913 |
| 3,100 | 2710,981 | 542,910 | 3,216 | 0,196 | 2400,304 |
| 3,500 | 3901,625 | 560,994 | 3,063 | 0,201 | 2494,965 |
| 3,900 | 5398,029 | 577,627 | 2,923 | 0,205 | 2579,372 |
| 4,300 | 7235,137 | 593,057 | 2,796 | 0,209 | 2655,530 |

| x | F_{11} | F_{12} | F_{13} | F_{14} | F_{15} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 8,524 | 1,339 | 0,984 | 25,381 | 18,510 |
| 1,300 | 8,588 | 1,245 | 0,977 | 24,938 | 21,020 |
| 1,500 | 8,716 | 1,093 | 0,962 | 24,096 | 26,638 |
| 1,700 | 8,846 | 0,974 | 0,947 | 23,310 | 33,056 |
| 1,900 | 8,978 | 0,878 | 0,933 | 22,573 | 40,275 |
| 2,200 | 9,179 | 0,765 | 0,912 | 21,552 | 52,602 |
| 2,500 | 9,385 | 0,678 | 0,893 | 20,619 | 66,730 |
| 2,800 | 9,596 | 0,609 | 0,874 | 19,763 | 82,658 |
| 3,100 | 9,811 | 0,552 | 0,856 | 18,975 | 100,385 |
| 3,500 | 10,106 | 0,491 | 0,833 | 18,018 | 126,822 |
| 3,900 | 10,410 | 0,443 | 0,812 | 17,153 | 156,459 |
| 4,300 | 10,722 | 0,403 | 0,791 | 16,367 | 189,296 |

| x | F_{16} | F_{17} | F_{18} | F_{19} | F_{20} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 75,288 | 162,686 | 11,768 | 1168,209 | 820,403 |
| 1,300 | 75,414 | 179,796 | 12,424 | 1183,417 | 888,473 |
| 1,500 | 75,641 | 219,603 | 13,597 | 1210,606 | 1024,630 |
| 1,700 | 75,840 | 268,223 | 14,624 | 1234,387 | 1160,809 |
| 1,900 | 76,018 | 327,609 | 15,536 | 1255,520 | 1297,011 |
| 2,200 | 76,252 | 442,226 | 16,738 | 1283,375 | 1501,355 |
| 2,500 | 76,457 | 596,942 | 17,786 | 1307,663 | 1705,750 |
| 2,800 | 76,639 | 805,788 | 18,716 | 1329,196 | 1910,195 |
| 3,100 | 76,803 | 1087,700 | 19,550 | 1348,534 | 2114,691 |
| 3,500 | 76,999 | 1622,657 | 20,545 | 1371,593 | 2387,430 |
| 3,900 | 77,174 | 2420,720 | 21,433 | 1392,153 | 2660,259 |
| 4,300 | 77,333 | 3611,290 | 22,233 | 1410,705 | 2933,177 |

| x | F_{21} | F_{22} | F_{23} | F_{24} | F_{25} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 1013,706 | 13,652 | 4,394 | 0,698 | 874,866 |
| 1,300 | 1097,828 | 13,900 | 4,715 | 0,706 | 881,473 |
| 1,500 | 1266,102 | 14,410 | 5,287 | 0,721 | 893,410 |
| 1,700 | 1434,416 | 14,938 | 5,788 | 0,733 | 903,984 |
| 1,900 | 1602,769 | 15,485 | 6,233 | 0,744 | 913,485 |
| 2,200 | 1855,372 | 16,345 | 6,819 | 0,759 | 926,160 |
| 2,500 | 2108,062 | 17,251 | 7,330 | 0,772 | 937,357 |
| 2,800 | 2360,842 | 18,209 | 7,784 | 0,783 | 947,395 |
| 3,100 | 2613,709 | 19,219 | 8,191 | 0,793 | 956,503 |
| 3,500 | 2951,003 | 20,654 | 8,676 | 0,806 | 967,477 |
| 3,900 | 3288,453 | 22,196 | 9,109 | 0,816 | 977,369 |
| 4,300 | 3626,060 | 23,853 | 9,500 | 0,826 | 986,381 |

| x | F_{26} | F_{27} | F_{28} | F_{29} | F_{30} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 23,127 | 709,144 | 0,944 | 23,525 | 7,807 |
| 1,300 | 24,649 | 768,169 | 1,016 | 25,355 | 7,851 |
| 1,500 | 27,698 | 886,225 | 1,157 | 29,070 | 7,940 |
| 1,700 | 30,754 | 1004,289 | 1,297 | 32,859 | 8,029 |
| 1,900 | 33,818 | 1122,361 | 1,435 | 36,721 | 8,120 |
| 2,200 | 38,426 | 1299,484 | 1,639 | 42,653 | 8,257 |
| 2,500 | 43,050 | 1476,625 | 1,842 | 48,750 | 8,397 |
| 2,800 | 47,690 | 1653,784 | 2,042 | 55,013 | 8,539 |
| 3,100 | 52,346 | 1830,961 | 2,240 | 61,441 | 8,684 |
| 3,500 | 58,578 | 2067,225 | 2,501 | 70,270 | 8,881 |
| 3,900 | 64,838 | 2303,521 | 2,760 | 79,393 | 9,082 |
| 4,300 | 71,127 | 2539,849 | 3,017 | 88,811 | 9,288 |

| x | F_{31} | F_{32} | F_{33} | F_{34} | F_{35} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 0,362 | 0,100 | 391,016 | 1,631 | 292,576 |
| 1,300 | 0,412 | 0,107 | 458,534 | 1,517 | 316,676 |
| 1,500 | 0,534 | 0,120 | 609,770 | 1,332 | 364,900 |
| 1,700 | 0,693 | 0,134 | 782,606 | 1,186 | 413,156 |
| 1,900 | 0,899 | 0,147 | 977,042 | 1,070 | 461,444 |
| 2,200 | 1,327 | 0,165 | 1309,196 | 0,932 | 533,936 |
| 2,500 | 1,960 | 0,184 | 1689,950 | 0,826 | 606,500 |
| 2,800 | 2,895 | 0,202 | 2119,304 | 0,741 | 679,136 |
| 3,100 | 4,276 | 0,220 | 2597,258 | 0,672 | 751,844 |
| 3,500 | 7,192 | 0,243 | 3310,130 | 0,598 | 848,900 |
| 3,900 | 12,097 | 0,266 | 4109,402 | 0,539 | 946,084 |
| 4,300 | 20,348 | 0,289 | 4995,074 | 0,490 | 1043,396 |

| x | F_{36} | F_{37} | F_{38} | F_{39} | F_{40} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 0,912 | 2,632 | 157,174 | 1,849 | 1,441 |
| 1,300 | 0,915 | 2,532 | 171,289 | 1,829 | 1,588 |
| 1,500 | 0,921 | 2,353 | 203,436 | 1,791 | 1,928 |
| 1,700 | 0,926 | 2,198 | 241,616 | 1,753 | 2,341 |
| 1,900 | 0,932 | 2,062 | 286,963 | 1,718 | 2,842 |
| 2,200 | 0,940 | 1,887 | 371,427 | 1,667 | 3,802 |
| 2,500 | 0,949 | 1,739 | 480,752 | 1,619 | 5,086 |
| 2,800 | 0,957 | 1,613 | 622,256 | 1,574 | 6,804 |
| 3,100 | 0,966 | 1,504 | 805,410 | 1,532 | 9,102 |
| 3,500 | 0,977 | 1,379 | 1136,094 | 1,478 | 13,417 |
| 3,900 | 0,989 | 1,274 | 1602,550 | 1,428 | 19,776 |
| 4,300 | 1,001 | 1,183 | 2260,523 | 1,382 | 29,151 |

| x | F_{41} | F_{42} | F_{43} | F_{44} | F_{45} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 4,950 | 57,416 | 2775,425 | 81,439 | 7,258 |
| 1,300 | 5,010 | 58,161 | 2822,650 | 85,445 | 7,670 |
| 1,500 | 5,115 | 59,491 | 2907,080 | 93,106 | 8,466 |
| 1,700 | 5,208 | 60,655 | 2980,926 | 100,367 | 9,230 |
| 1,900 | 5,290 | 61,690 | 3046,549 | 107,294 | 9,966 |
| 2,200 | 5,399 | 63,053 | 3133,045 | 117,159 | 11,027 |
| 2,500 | 5,493 | 64,242 | 3208,467 | 126,499 | 12,044 |
| 2,800 | 5,577 | 65,296 | 3275,331 | 135,400 | 13,023 |
| 3,100 | 5,653 | 66,243 | 3335,383 | 143,926 | 13,971 |
| 3,500 | 5,742 | 67,371 | 3406,985 | 154,797 | 15,191 |
| 3,900 | 5,823 | 68,378 | 3470,831 | 165,182 | 16,369 |
| 4,300 | 5,895 | 69,286 | 3528,438 | 175,147 | 17,509 |

| x | F_{46} | F_{47} | F_{48} | F_{49} | F_{50} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 0,484 | 2,809 | 398,006 | 6,782 | 0,225 |
| 1,300 | 0,615 | 2,618 | 431,007 | 7,436 | 0,221 |
| 1,500 | 0,945 | 2,304 | 497,009 | 8,898 | 0,214 |
| 1,700 | 1,376 | 2,058 | 563,012 | 10,568 | 0,208 |
| 1,900 | 1,921 | 1,859 | 629,014 | 12,447 | 0,202 |
| 2,200 | 2,981 | 1,623 | 728,019 | 15,654 | 0,194 |
| 2,500 | 4,375 | 1,441 | 827,025 | 19,330 | 0,186 |
| 2,800 | 6,147 | 1,295 | 926,031 | 23,474 | 0,179 |
| 3,100 | 8,341 | 1,176 | 1025,038 | 28,085 | 0,172 |
| 3,500 | 12,005 | 1,048 | 1157,049 | 34,962 | 0,164 |
| 3,900 | 16,609 | 0,945 | 1289,061 | 42,671 | 0,157 |
| 4,300 | 22,262 | 0,861 | 1421,074 | 51,212 | 0,150 |

| x | F_{51} | F_{52} | F_{53} | F_{54} | F_{55} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 9,143 | 0,756 | 0,884 | 0,127 | 0,776 |
| 1,300 | 9,190 | 0,803 | 0,893 | 0,128 | 0,720 |
| 1,500 | 9,284 | 0,887 | 0,910 | 0,131 | 0,630 |
| 1,700 | 9,379 | 0,961 | 0,927 | 0,133 | 0,559 |
| 1,900 | 9,475 | 1,027 | 0,944 | 0,135 | 0,503 |
| 2,200 | 9,621 | 1,113 | 0,971 | 0,138 | 0,437 |
| 2,500 | 9,769 | 1,189 | 0,999 | 0,140 | 0,386 |
| 2,800 | 9,920 | 1,256 | 1,028 | 0,143 | 0,346 |
| 3,100 | 10,073 | 1,316 | 1,057 | 0,145 | 0,314 |
| 3,500 | 10,281 | 1,387 | 1,098 | 0,147 | 0,279 |
| 3,900 | 10,493 | 1,451 | 1,140 | 0,149 | 0,251 |
| 4,300 | 10,709 | 1,509 | 1,184 | 0,151 | 0,228 |

| x | F_{56} | F_{57} | F_{58} | F_{59} | F_{60} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 17,549 | 10,276 | 5,869 | 2,597 | 0,990 |
| 1,300 | 17,685 | 11,816 | 5,583 | 2,445 | 0,993 |
| 1,500 | 17,959 | 15,250 | 5,089 | 2,188 | 0,998 |
| 1,700 | 18,238 | 19,156 | 4,675 | 1,980 | 1,003 |
| 1,900 | 18,521 | 23,534 | 4,323 | 1,808 | 1,009 |
| 2,200 | 18,954 | 30,986 | 3,885 | 1,600 | 1,017 |
| 2,500 | 19,396 | 39,500 | 3,527 | 1,435 | 1,024 |
| 2,800 | 19,850 | 49,076 | 3,230 | 1,300 | 1,032 |
| 3,100 | 20,314 | 59,714 | 2,979 | 1,189 | 1,041 |
| 3,500 | 20,949 | 75,550 | 2,699 | 1,067 | 1,051 |
| 3,900 | 21,604 | 93,274 | 2,467 | 0,968 | 1,062 |
| 4,300 | 22,280 | 112,886 | 2,272 | 0,886 | 1,074 |

| x | F_{61} | F_{62} | F_{63} | F_{64} | F_{65} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 0,309 | 66,637 | 792,905 | 4,817 | 0,800 |
| 1,300 | 0,314 | 66,690 | 798,637 | 4,764 | 0,742 |
| 1,500 | 0,321 | 66,797 | 808,989 | 4,662 | 0,649 |
| 1,700 | 0,328 | 66,904 | 818,154 | 4,564 | 0,576 |
| 1,900 | 0,335 | 67,011 | 826,385 | 4,470 | 0,518 |
| 2,200 | 0,343 | 67,172 | 837,361 | 4,337 | 0,450 |
| 2,500 | 0,351 | 67,333 | 847,050 | 4,211 | 0,398 |
| 2,800 | 0,357 | 67,495 | 855,734 | 4,092 | 0,357 |
| 3,100 | 0,364 | 67,657 | 863,609 | 3,979 | 0,323 |
| 3,500 | 0,371 | 67,874 | 873,093 | 3,839 | 0,287 |
| 3,900 | 0,378 | 68,092 | 881,638 | 3,708 | 0,258 |
| 4,300 | 0,384 | 68,310 | 889,420 | 3,586 | 0,235 |

| x | F_{66} | F_{67} | F_{68} | F_{69} | F_{70} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 9,032 | 809,968 | 878,792 | 0,219 | 177,232 |
| 1,300 | 9,407 | 836,382 | 951,930 | 0,222 | 207,268 |
| 1,500 | 10,175 | 883,605 | 1098,237 | 0,227 | 274,540 |
| 1,700 | 10,967 | 924,909 | 1244,590 | 0,231 | 351,412 |
| 1,900 | 11,783 | 961,613 | 1390,986 | 0,234 | 437,884 |
| 2,200 | 13,052 | 1009,992 | 1610,662 | 0,239 | 585,592 |
| 2,500 | 14,375 | 1052,177 | 1830,438 | 0,243 | 754,900 |
| 2,800 | 15,752 | 1089,576 | 2050,312 | 0,247 | 945,808 |
| 3,100 | 17,183 | 1123,164 | 2270,285 | 0,251 | 1158,316 |
| 3,500 | 19,175 | 1163,213 | 2563,738 | 0,255 | 1475,260 |
| 3,900 | 21,263 | 1198,924 | 2857,365 | 0,258 | 1830,604 |
| 4,300 | 23,447 | 1231,144 | 3151,169 | 0,261 | 2224,348 |

| x | F_{71} | F_{72} | F_{73} | F_{74} | F_{75} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 474,094 | 0,847 | 10,101 | 272,250 | 727,577 |
| 1,300 | 513,284 | 0,833 | 9,756 | 300,882 | 736,361 |
| 1,500 | 591,710 | 0,806 | 9,132 | 367,499 | 754,247 |
| 1,700 | 670,196 | 0,781 | 8,584 | 448,864 | 772,568 |
| 1,900 | 748,744 | 0,758 | 8,097 | 548,243 | 791,334 |
| 2,200 | 866,678 | 0,725 | 7,463 | 740,051 | 820,341 |
| 2,500 | 984,750 | 0,694 | 6,920 | 998,965 | 850,411 |
| 2,800 | 1102,958 | 0,667 | 6,452 | 1348,461 | 881,584 |
| 3,100 | 1221,304 | 0,641 | 6,042 | 1820,232 | 913,899 |
| 3,500 | 1379,310 | 0,610 | 5,571 | 2715,467 | 958,836 |
| 3,900 | 1537,560 | 0,581 | 5,168 | 4051,001 | 1005,982 |
| 4,300 | 1696,052 | 0,556 | 4,819 | 6043,383 | 1055,447 |

| x | F_{76} | F_{77} | F_{78} | F_{79} | F_{80} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 1,462 | 0,777 | 1,091 | 1041,084 | 0,152 |
| 1,300 | 1,525 | 0,781 | 1,154 | 1115,273 | 0,152 |
| 1,500 | 1,638 | 0,787 | 1,275 | 1261,329 | 0,152 |
| 1,700 | 1,737 | 0,793 | 1,392 | 1404,676 | 0,151 |
| 1,900 | 1,825 | 0,800 | 1,505 | 1545,675 | 0,151 |
| 2,200 | 1,940 | 0,810 | 1,667 | 1753,370 | 0,151 |
| 2,500 | 2,041 | 0,820 | 1,823 | 1957,124 | 0,150 |
| 2,800 | 2,131 | 0,830 | 1,974 | 2157,476 | 0,150 |
| 3,100 | 2,211 | 0,840 | 2,119 | 2354,838 | 0,150 |
| 3,500 | 2,307 | 0,854 | 2,307 | 2613,897 | 0,149 |
| 3,900 | 2,393 | 0,868 | 2,489 | 2868,835 | 0,149 |
| 4,300 | 2,470 | 0,883 | 2,665 | 3120,131 | 0,148 |

| x | F_{81} | F_{82} | F_{83} | F_{84} | F_{85} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 57,320 | 2,822 | 0,768 | 1,084 | 4,155 |
| 1,300 | 65,580 | 2,773 | 0,770 | 1,213 | 4,212 |
| 1,500 | 83,900 | 2,681 | 0,773 | 1,482 | 4,313 |
| 1,700 | 104,620 | 2,595 | 0,776 | 1,766 | 4,402 |
| 1,900 | 127,740 | 2,514 | 0,779 | 2,063 | 4,481 |
| 2,200 | 166,920 | 2,402 | 0,784 | 2,533 | 4,585 |
| 2,500 | 211,500 | 2,299 | 0,788 | 3,030 | 4,676 |
| 2,800 | 261,480 | 2,205 | 0,793 | 3,551 | 4,757 |
| 3,100 | 316,860 | 2,118 | 0,798 | 4,094 | 4,829 |
| 3,500 | 399,100 | 2,012 | 0,804 | 4,853 | 4,915 |
| 3,900 | 490,940 | 1,916 | 0,811 | 5,646 | 4,992 |
| 4,300 | 592,380 | 1,829 | 0,817 | 6,473 | 5,061 |

| x | F_{86} | F_{87} | F_{88} | F_{89} | F_{90} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 0,178 | 0,655 | 2,732 | 0,247 | 11,014 |
| 1,300 | 0,184 | 0,657 | 2,805 | 0,247 | 12,223 |
| 1,500 | 0,195 | 0,661 | 2,957 | 0,246 | 14,928 |
| 1,700 | 0,205 | 0,665 | 3,116 | 0,246 | 18,017 |
| 1,900 | 0,213 | 0,668 | 3,282 | 0,245 | 21,489 |
| 2,200 | 0,224 | 0,672 | 3,545 | 0,245 | 27,419 |
| 2,500 | 0,234 | 0,676 | 3,825 | 0,244 | 34,213 |
| 2,800 | 0,243 | 0,679 | 4,121 | 0,243 | 41,870 |
| 3,100 | 0,250 | 0,682 | 4,434 | 0,242 | 50,392 |
| 3,500 | 0,260 | 0,686 | 4,877 | 0,242 | 63,098 |
| 3,900 | 0,268 | 0,689 | 5,349 | 0,241 | 77,340 |
| 4,300 | 0,275 | 0,692 | 5,851 | 0,240 | 93,118 |

| x | F_{91} | F_{92} | F_{93} | F_{94} | F_{95} |
|-------|----------|----------|----------|----------|----------|
| 1,200 | 0,219 | 18,640 | 25,488 | 5,663 | 53,410 |
| 1,300 | 0,249 | 21,020 | 26,171 | 5,394 | 53,888 |
| 1,500 | 0,323 | 26,200 | 27,436 | 4,926 | 54,855 |
| 1,700 | 0,419 | 31,940 | 28,593 | 4,533 | 55,841 |
| 1,900 | 0,544 | 38,240 | 29,662 | 4,198 | 56,843 |
| 2,200 | 0,803 | 48,740 | 31,132 | 3,779 | 58,382 |
| 2,500 | 1,186 | 60,500 | 32,474 | 3,436 | 59,961 |
| 2,800 | 1,752 | 73,520 | 33,711 | 3,151 | 61,584 |
| 3,100 | 2,588 | 87,800 | 34,863 | 2,909 | 63,250 |
| 3,500 | 4,353 | 108,800 | 36,287 | 2,639 | 65,543 |
| 3,900 | 7,322 | 132,040 | 37,606 | 2,414 | 67,918 |
| 4,300 | 12,316 | 157,520 | 38,838 | 2,225 | 70,379 |

| x | F_{96} | F_{97} | F_{98} | F_{99} | F_{100} |
|-------|----------|----------|----------|----------|-----------|
| 1,200 | 0,932 | 3,728 | 1983,256 | 4,961 | 7,292 |
| 1,300 | 0,866 | 3,963 | 2023,277 | 4,988 | 7,571 |
| 1,500 | 0,758 | 4,437 | 2094,827 | 5,037 | 8,131 |
| 1,700 | 0,674 | 4,916 | 2157,409 | 5,080 | 8,694 |
| 1,900 | 0,607 | 5,400 | 2213,022 | 5,119 | 9,260 |
| 2,200 | 0,528 | 6,135 | 2286,323 | 5,170 | 10,114 |
| 2,500 | 0,468 | 6,881 | 2350,240 | 5,215 | 10,975 |
| 2,800 | 0,419 | 7,638 | 2406,905 | 5,255 | 11,842 |
| 3,100 | 0,380 | 8,406 | 2457,796 | 5,292 | 12,716 |
| 3,500 | 0,338 | 9,447 | 2518,476 | 5,336 | 13,891 |
| 3,900 | 0,304 | 10,508 | 2572,583 | 5,375 | 15,078 |
| 4,300 | 0,277 | 11,588 | 2621,402 | 5,411 | 16,276 |

8 Задание VIII

VIII. Вычислить значения функции $y = F(x)$ в двух заданных точках с использованием прямой и обратной интерполяционных формул Ньютона.

| | | | | | |
|----------|-----------|-----------|-----------|-----------|-----------|
| x | 2,00 | 2,01 | 2,02 | 2,03 | 2,04 |
| $F_1(x)$ | -2,940024 | -2,954797 | -2,969718 | -2,984785 | -3,000000 |

$$F_1(2,0326) = ?$$

$$F_1(2,0063) = ?$$

| | | | | | |
|----------|-----------|-----------|-----------|-----------|-----------|
| x | 2,05 | 2,06 | 2,07 | 2,08 | 2,09 |
| $F_2(x)$ | -5,901004 | -5,925406 | -5,950040 | -5,974904 | -6,000000 |

$$F_2(2,0746) = ?$$

$$F_2(2,0712) = ?$$

| | | | | | |
|----------|-----------|-----------|-----------|-----------|-----------|
| x | 2,10 | 2,11 | 2,12 | 2,13 | 2,14 |
| $F_3(x)$ | -2,964227 | -2,972954 | -2,981825 | -2,990840 | -3,000000 |

$$F_3(2,1144) = ?$$

$$F_3(2,1389) = ?$$

| | | | | | |
|----------|-----------|-----------|-----------|-----------|-----------|
| x | 2,15 | 2,16 | 2,17 | 2,18 | 2,19 |
| $F_4(x)$ | -4,948719 | -4,961252 | -4,973977 | -4,986893 | -5,000000 |

$$F_4(2,1845) = ?$$

$$F_4(2,1819) = ?$$

| | | | | | |
|----------|----------|----------|----------|----------|----------|
| x | 2,20 | 2,21 | 2,22 | 2,23 | 2,24 |
| $F_5(x)$ | 8,649160 | 8,735635 | 8,822930 | 8,911049 | 9,000000 |

$$F_5(2,2024) = ?$$

$$F_5(2,2159) = ?$$

| | | | | | |
|----------|----------|----------|----------|----------|----------|
| x | 2,25 | 2,26 | 2,27 | 2,28 | 2,29 |
| $F_6(x)$ | 7,656917 | 7,741498 | 7,826869 | 7,913034 | 8,000000 |

$$F_6(2,2615) = ?$$

$$F_6(2,2760) = ?$$

| | | | | | |
|----------|----------|----------|----------|----------|----------|
| x | 2,30 | 2,31 | 2,32 | 2,33 | 2,34 |
| $F_7(x)$ | 8,630475 | 8,721700 | 8,813693 | 8,906458 | 9,000000 |

$$F_7(2,3239) = ?$$

$$F_7(2,3216) = ?$$

| | | | | | |
|----------|----------|----------|----------|----------|----------|
| x | 2,35 | 2,36 | 2,37 | 2,38 | 2,39 |
| $F_8(x)$ | 1,911459 | 1,933320 | 1,955364 | 1,977590 | 2,000000 |

$$F_8(2,3865) = ?$$

$$F_8(2,3822) = ?$$

| | | | | | |
|----------|----------|----------|----------|----------|----------|
| x | 2,40 | 2,41 | 2,42 | 2,43 | 2,44 |
| $F_9(x)$ | 8,554084 | 8,663992 | 8,774943 | 8,886943 | 9,000000 |

$$F_9(2,4366) = ?$$

$$F_9(2,4125) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 2,45 | 2,46 | 2,47 | 2,48 | 2,49 |
| $F_{10}(x)$ | 1,888071 | 1,915664 | 1,943515 | 1,971627 | 2,000000 |

$$F_{10}(2,4626) = ?$$

$$F_{10}(2,4674) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 2,50 | 2,51 | 2,52 | 2,53 | 2,54 |
| $F_{11}(x)$ | 4,751900 | 4,813151 | 4,874915 | 4,937197 | 5,000000 |

$$F_{11}(2,5029) = ?$$

$$F_{11}(2,5140) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 2,55 | 2,56 | 2,57 | 2,58 | 2,59 |
| $F_{12}(x)$ | 4,728030 | 4,795181 | 4,862891 | 4,931163 | 5,000000 |

$$F_{12}(2,5831) = ?$$

$$F_{12}(2,5659) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,60 | 2,61 | 2,62 | 2,63 | 2,64 |
| $F_{13}(x)$ | -5,686999 | -5,763916 | -5,841716 | -5,920408 | -6,000000 |

$$F_{13}(2,6387) = ?$$

$$F_{13}(2,6255) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,65 | 2,66 | 2,67 | 2,68 | 2,69 |
| $F_{14}(x)$ | -3,798128 | -3,847747 | -3,897929 | -3,948679 | -4,000000 |

$$F_{14}(2,6542) = ?$$

$$F_{14}(2,6559) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,70 | 2,71 | 2,72 | 2,73 | 2,74 |
| $F_{15}(x)$ | -7,591181 | -7,691661 | -7,793285 | -7,896061 | -8,000000 |

$$F_{15}(2,7124) = ?$$

$$F_{15}(2,7180) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,75 | 2,76 | 2,77 | 2,78 | 2,79 |
| $F_{16}(x)$ | -7,603214 | -7,700762 | -7,799402 | -7,899146 | -8,000000 |

$$F_{16}(2,7788) = ?$$

$$F_{16}(2,7675) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,80 | 2,81 | 2,82 | 2,83 | 2,84 |
| $F_{17}(x)$ | -6,670166 | -6,751329 | -6,833352 | -6,916240 | -7,000000 |

$$F_{17}(2,8337) = ?$$

$$F_{17}(2,8255) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,85 | 2,86 | 2,87 | 2,88 | 2,89 |
| $F_{18}(x)$ | -1,907988 | -1,930634 | -1,953517 | -1,976639 | -2,000000 |

$$F_{18}(2,8715) = ?$$

$$F_{18}(2,8874) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,90 | 2,91 | 2,92 | 2,93 | 2,94 |
| $F_{19}(x)$ | -1,907122 | -1,929982 | -1,953080 | -1,976419 | -2,000000 |

$$F_{19}(2,9312) = ?$$

$$F_{19}(2,9339) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 2,95 | 2,96 | 2,97 | 2,98 | 2,99 |
| $F_{20}(x)$ | -3,818318 | -3,863045 | -3,908232 | -3,953882 | -4,000000 |

$$F_{20}(2,9767) = ?$$

$$F_{20}(2,9627) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,00 | 3,01 | 3,02 | 3,03 | 3,04 |
| $F_{21}(x)$ | -2,836983 | -2,877059 | -2,917585 | -2,958564 | -3,000000 |

$$F_{21}(3,0332) = ?$$

$$F_{21}(3,0234) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,05 | 3,06 | 3,07 | 3,08 | 3,09 |
| $F_{22}(x)$ | -3,790030 | -3,841662 | -3,893865 | -3,946643 | -4,000000 |

$$F_{22}(3,0648) = ?$$

$$F_{22}(3,0640) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,10 | 3,11 | 3,12 | 3,13 | 3,14 |
| $F_{23}(x)$ | -6,627058 | -6,718766 | -6,811486 | -6,905229 | -7,000000 |

$$F_{23}(3,1142) = ?$$

$$F_{23}(3,1043) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,15 | 3,16 | 3,17 | 3,18 | 3,19 |
| $F_{24}(x)$ | -6,638749 | -6,727604 | -6,817426 | -6,908222 | -7,000000 |

$$F_{24}(3,1631) = ?$$

$$F_{24}(3,1679) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,20 | 3,21 | 3,22 | 3,23 | 3,24 |
| $F_{25}(x)$ | -3,808324 | -3,855516 | -3,903190 | -3,951350 | -4,000000 |

$$F_{25}(3,2218) = ?$$

$$F_{25}(3,2090) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,25 | 3,26 | 3,27 | 3,28 | 3,29 |
| $F_{26}(x)$ | -8,579181 | -8,682810 | -8,787485 | -8,893212 | -9,000000 |

$$F_{26}(3,2832) = ?$$

$$F_{26}(3,2874) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,30 | 3,31 | 3,32 | 3,33 | 3,34 |
| $F_{27}(x)$ | -7,622075 | -7,715145 | -7,809151 | -7,904101 | -8,000000 |

$$F_{27}(3,3222) = ?$$

$$F_{27}(3,3044) = ?$$

| | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|
| x | 3,35 | 3,36 | 3,37 | 3,38 | 3,39 |
| $F_{28}(x)$ | -7,630709 | -7,721672 | -7,813537 | -7,906311 | -8,000000 |

$$F_{28}(3,3869) = ?$$

$$F_{28}(3,3888) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,40 | 3,41 | 3,42 | 3,43 | 3,44 |
| $F_{29}(x)$ | 2,833930 | 2,874707 | 2,915975 | 2,957738 | 3,000000 |

$$F_{29}(3,4361) = ?$$

$$F_{29}(3,4351) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,45 | 3,46 | 3,47 | 3,48 | 3,49 |
| $F_{30}(x)$ | 6,615842 | 6,710191 | 6,805660 | 6,902260 | 7,000000 |

$$F_{30}(3,4648) = ?$$

$$F_{30}(3,4649) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,50 | 3,51 | 3,52 | 3,53 | 3,54 |
| $F_{31}(x)$ | 7,567772 | 7,673954 | 7,781379 | 7,890057 | 8,000000 |

$$F_{31}(3,5257) = ?$$

$$F_{31}(3,5261) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,55 | 3,56 | 3,57 | 3,58 | 3,59 |
| $F_{32}(x)$ | 1,892896 | 1,919213 | 1,945835 | 1,972763 | 2,000000 |

$$F_{32}(3,5539) = ?$$

$$F_{32}(3,5745) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,60 | 3,61 | 3,62 | 3,63 | 3,64 |
| $F_{33}(x)$ | 3,785519 | 3,838225 | 3,891537 | 3,945461 | 4,000000 |

$$F_{33}(3,6313) = ?$$

$$F_{33}(3,6112) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,65 | 3,66 | 3,67 | 3,68 | 3,69 |
| $F_{34}(x)$ | 4,734449 | 4,799720 | 4,865731 | 4,932489 | 5,000000 |

$$F_{34}(3,6882) = ?$$

$$F_{34}(3,6760) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,70 | 3,71 | 3,72 | 3,73 | 3,74 |
| $F_{35}(x)$ | 4,738469 | 4,802767 | 4,867784 | 4,933526 | 5,000000 |

$$F_{35}(3,7069) = ?$$

$$F_{35}(3,7070) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,75 | 3,76 | 3,77 | 3,78 | 3,79 |
| $F_{36}(x)$ | 6,637352 | 6,726528 | 6,816689 | 6,907844 | 7,000000 |

$$F_{36}(3,7543) = ?$$

$$F_{36}(3,7532) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,80 | 3,81 | 3,82 | 3,83 | 3,84 |
| $F_{37}(x)$ | 2,851780 | 2,888248 | 2,925105 | 2,962355 | 3,000000 |

$$F_{37}(3,8263) = ?$$

$$F_{37}(3,8322) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,85 | 3,86 | 3,87 | 3,88 | 3,89 |
| $F_{38}(x)$ | 3,804084 | 3,852296 | 3,901017 | 3,950250 | 4,000000 |

$$F_{38}(3,8572) = ?$$

$$F_{38}(3,8872) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,90 | 3,91 | 3,92 | 3,93 | 3,94 |
| $F_{39}(x)$ | 1,903301 | 1,927102 | 1,951151 | 1,975449 | 2,000000 |

$$F_{39}(3,9134) = ?$$

$$F_{39}(3,9378) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 3,95 | 3,96 | 3,97 | 3,98 | 3,99 |
| $F_{40}(x)$ | 6,664502 | 6,747094 | 6,830537 | 6,914836 | 7,000000 |

$$F_{40}(3,9766) = ?$$

$$F_{40}(3,9647) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,00 | 4,01 | 4,02 | 4,03 | 4,04 |
| $F_{41}(x)$ | 6,664957 | 6,747445 | 6,830777 | 6,914960 | 7,000000 |

$$F_{41}(4,0072) = ?$$

$$F_{41}(4,0336) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,05 | 4,06 | 4,07 | 4,08 | 4,09 |
| $F_{42}(x)$ | 2,857715 | 2,892752 | 2,928143 | 2,963892 | 3,000000 |

$$F_{42}(4,0857) = ?$$

$$F_{42}(4,0719) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,10 | 4,11 | 4,12 | 4,13 | 4,14 |
| $F_{43}(x)$ | 1,906336 | 1,929404 | 1,952703 | 1,976235 | 2,000000 |

$$F_{43}(4,1022) = ?$$

$$F_{43}(4,1114) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,15 | 4,16 | 4,17 | 4,18 | 4,19 |
| $F_{44}(x)$ | 7,628738 | 7,720191 | 7,812548 | 7,905816 | 8,000000 |

$$F_{44}(4,1883) = ?$$

$$F_{44}(4,1616) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,20 | 4,21 | 4,22 | 4,23 | 4,24 |
| $F_{45}(x)$ | 4,753060 | 4,813838 | 4,875250 | 4,937303 | 5,000000 |

$$F_{45}(4,2383) = ?$$

$$F_{45}(4,2387) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,25 | 4,26 | 4,27 | 4,28 | 4,29 |
| $F_{46}(x)$ | 1,902203 | 1,926278 | 1,950601 | 1,975174 | 2,000000 |

$$F_{46}(4,2767) = ?$$

$$F_{46}(4,2542) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,30 | 4,31 | 4,32 | 4,33 | 4,34 |
| $F_{47}(x)$ | 7,614234 | 7,709217 | 7,805167 | 7,902092 | 8,000000 |

$$F_{47}(4,3178) = ?$$

$$F_{47}(4,3274) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,35 | 4,36 | 4,37 | 4,38 | 4,39 |
| $F_{48}(x)$ | 6,665764 | 6,748074 | 6,831212 | 6,915185 | 7,000000 |

$$F_{48}(4,3561) = ?$$

$$F_{48}(4,3771) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,40 | 4,41 | 4,42 | 4,43 | 4,44 |
| $F_{49}(x)$ | 7,618475 | 7,712440 | 7,807344 | 7,903195 | 8,000000 |

$$F_{49}(4,4356) = ?$$

$$F_{49}(4,4130) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,45 | 4,46 | 4,47 | 4,48 | 4,49 |
| $F_{50}(x)$ | 8,575127 | 8,679786 | 8,785479 | 8,892215 | 9,000000 |

$$F_{50}(4,4856) = ?$$

$$F_{50}(4,4519) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,50 | 4,51 | 4,52 | 4,53 | 4,54 |
| $F_{51}(x)$ | 3,813692 | 3,859594 | 3,905943 | 3,952744 | 4,000000 |

$$F_{51}(4,5263) = ?$$

$$F_{51}(4,5388) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,55 | 4,56 | 4,57 | 4,58 | 4,59 |
| $F_{52}(x)$ | 7,631094 | 7,721998 | 7,813780 | 7,906445 | 8,000000 |

$$F_{52}(4,5736) = ?$$

$$F_{52}(4,5812) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,60 | 4,61 | 4,62 | 4,63 | 4,64 |
| $F_{53}(x)$ | 6,690398 | 6,766723 | 6,843761 | 6,921518 | 7,000000 |

$$F_{53}(4,6240) = ?$$

$$F_{53}(4,6021) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,65 | 4,66 | 4,67 | 4,68 | 4,69 |
| $F_{54}(x)$ | 7,649383 | 7,735831 | 7,823080 | 7,911134 | 8,000000 |

$$F_{54}(4,6731) = ?$$

$$F_{54}(4,6639) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,70 | 4,71 | 4,72 | 4,73 | 4,74 |
| $F_{55}(x)$ | 6,696767 | 6,771544 | 6,847005 | 6,923155 | 7,000000 |

$$F_{55}(4,7038) = ?$$

$$F_{55}(4,7163) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,75 | 4,76 | 4,77 | 4,78 | 4,79 |
| $F_{56}(x)$ | 1,914140 | 1,935316 | 1,956684 | 1,978245 | 2,000000 |

$$F_{56}(4,7590) = ?$$

$$F_{56}(4,7868) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,80 | 4,81 | 4,82 | 4,83 | 4,84 |
| $F_{57}(x)$ | 6,700318 | 6,774237 | 6,848820 | 6,924073 | 7,000000 |

$$F_{57}(4,8046) = ?$$

$$F_{57}(4,8137) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,85 | 4,86 | 4,87 | 4,88 | 4,89 |
| $F_{58}(x)$ | 8,618221 | 8,712402 | 8,807422 | 8,903286 | 9,000000 |

$$F_{58}(4,8765) = ?$$

$$F_{58}(4,8789) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,90 | 4,91 | 4,92 | 4,93 | 4,94 |
| $F_{59}(x)$ | 1,916116 | 1,936812 | 1,957691 | 1,978753 | 2,000000 |

$$F_{59}(4,9234) = ?$$

$$F_{59}(4,9141) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 4,95 | 4,96 | 4,97 | 4,98 | 4,99 |
| $F_{60}(x)$ | 5,750618 | 5,812156 | 5,874230 | 5,936843 | 6,000000 |

$$F_{60}(4,9658) = ?$$

$$F_{60}(4,9627) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,00 | 5,01 | 5,02 | 5,03 | 5,04 |
| $F_{61}(x)$ | 1,911770 | 1,933533 | 1,955492 | 1,977647 | 2,000000 |

$$F_{61}(5,0129) = ?$$

$$F_{61}(5,0051) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,05 | 5,06 | 5,07 | 5,08 | 5,09 |
| $F_{62}(x)$ | 4,781905 | 4,835711 | 4,889993 | 4,944755 | 5,000000 |

$$F_{62}(5,0735) = ?$$

$$F_{62}(5,0645) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,10 | 5,11 | 5,12 | 5,13 | 5,14 |
| $F_{63}(x)$ | 2,870724 | 2,902622 | 2,934800 | 2,967258 | 3,000000 |

$$F_{63}(5,1020) = ?$$

$$F_{63}(5,1130) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,15 | 5,16 | 5,17 | 5,18 | 5,19 |
| $F_{64}(x)$ | 8,616425 | 8,711084 | 8,806563 | 8,902866 | 9,000000 |

$$F_{64}(5,1886) = ?$$

$$F_{64}(5,1865) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,20 | 5,21 | 5,22 | 5,23 | 5,24 |
| $F_{65}(x)$ | 6,704097 | 6,777129 | 6,850788 | 6,925077 | 7,000000 |

$$F_{65}(5,2131) = ?$$

$$F_{65}(5,2141) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,25 | 5,26 | 5,27 | 5,28 | 5,29 |
| $F_{66}(x)$ | 4,790928 | 4,842537 | 4,894583 | 4,947070 | 5,000000 |

$$F_{66}(5,2614) = ?$$

$$F_{66}(5,2777) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,30 | 5,31 | 5,32 | 5,33 | 5,34 |
| $F_{67}(x)$ | 1,917333 | 1,937742 | 1,958322 | 1,979074 | 2,000000 |

$$F_{67}(5,3272) = ?$$

$$F_{67}(5,3261) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,35 | 5,36 | 5,37 | 5,38 | 5,39 |
| $F_{68}(x)$ | 6,713722 | 6,784408 | 6,855681 | 6,927543 | 7,000000 |

$$F_{68}(5,3526) = ?$$

$$F_{68}(5,3742) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,40 | 5,41 | 5,42 | 5,43 | 5,44 |
| $F_{69}(x)$ | 2,879923 | 2,909578 | 2,939475 | 2,969615 | 3,000000 |

$$F_{69}(5,4310) = ?$$

$$F_{69}(5,4131) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,45 | 5,46 | 5,47 | 5,48 | 5,49 |
| $F_{70}(x)$ | 1,920754 | 1,940328 | 1,960059 | 1,979950 | 2,000000 |

$$F_{70}(5,4557) = ?$$

$$F_{70}(5,4664) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,50 | 5,51 | 5,52 | 5,53 | 5,54 |
| $F_{71}(x)$ | 2,882393 | 2,911445 | 2,940730 | 2,970247 | 3,000000 |

$$F_{71}(5,5285) = ?$$

$$F_{71}(5,5286) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,55 | 5,56 | 5,57 | 5,58 | 5,59 |
| $F_{72}(x)$ | 1,922367 | 1,941547 | 1,960878 | 1,980362 | 2,000000 |

$$F_{72}(5,5563) = ?$$

$$F_{72}(5,5665) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,60 | 5,61 | 5,62 | 5,63 | 5,64 |
| $F_{73}(x)$ | 8,653339 | 8,738994 | 8,825319 | 8,912320 | 9,000000 |

$$F_{73}(5,6286) = ?$$

$$F_{73}(5,6266) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,65 | 5,66 | 5,67 | 5,68 | 5,69 |
| $F_{74}(x)$ | 4,809282 | 4,856411 | 4,903905 | 4,951768 | 5,000000 |

$$F_{74}(5,6543) = ?$$

$$F_{74}(5,6627) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,70 | 5,71 | 5,72 | 5,73 | 5,74 |
| $F_{75}(x)$ | 3,848980 | 3,886303 | 3,923913 | 3,961812 | 4,000000 |

$$F_{75}(5,7257) = ?$$

$$F_{75}(5,7174) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,75 | 5,76 | 5,77 | 5,78 | 5,79 |
| $F_{76}(x)$ | 2,887813 | 2,915542 | 2,943482 | 2,971634 | 3,000000 |

$$F_{76}(5,7787) = ?$$

$$F_{76}(5,7515) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,80 | 5,81 | 5,82 | 5,83 | 5,84 |
| $F_{77}(x)$ | 4,808578 | 4,855882 | 4,903553 | 4,951591 | 5,000000 |

$$F_{77}(5,8167) = ?$$

$$F_{77}(5,8387) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,85 | 5,86 | 5,87 | 5,88 | 5,89 |
| $F_{78}(x)$ | 2,886284 | 2,914388 | 2,942709 | 2,971245 | 3,000000 |

$$F_{78}(5,8650) = ?$$

$$F_{78}(5,8776) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,90 | 5,91 | 5,92 | 5,93 | 5,94 |
| $F_{79}(x)$ | 7,699892 | 7,774071 | 7,848814 | 7,924122 | 8,000000 |

$$F_{79}(5,9282) = ?$$

$$F_{79}(5,9317) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 5,95 | 5,96 | 5,97 | 5,98 | 5,99 |
| $F_{80}(x)$ | 7,702794 | 7,776265 | 7,850287 | 7,924864 | 8,000000 |

$$F_{80}(5,9838) = ?$$

$$F_{80}(5,9787) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,00 | 6,01 | 6,02 | 6,03 | 6,04 |
| $F_{81}(x)$ | 6,741945 | 6,805743 | 6,870017 | 6,934768 | 7,000000 |

$$F_{81}(6,0272) = ?$$

$$F_{81}(6,0030) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,05 | 6,06 | 6,07 | 6,08 | 6,09 |
| $F_{82}(x)$ | 2,890459 | 2,917543 | 2,944828 | 2,972313 | 3,000000 |

$$F_{82}(6,0766) = ?$$

$$F_{82}(6,0623) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,10 | 6,11 | 6,12 | 6,13 | 6,14 |
| $F_{83}(x)$ | 3,855392 | 3,891151 | 3,927171 | 3,963453 | 4,000000 |

$$F_{83}(6,1381) = ?$$

$$F_{83}(6,1114) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,15 | 6,16 | 6,17 | 6,18 | 6,19 |
| $F_{84}(x)$ | 5,785111 | 5,838254 | 5,891782 | 5,945696 | 6,000000 |

$$F_{84}(6,1812) = ?$$

$$F_{84}(6,1616) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,20 | 6,21 | 6,22 | 6,23 | 6,24 |
| $F_{85}(x)$ | 4,824080 | 4,867592 | 4,911416 | 4,955551 | 5,000000 |

$$F_{85}(6,2019) = ?$$

$$F_{85}(6,2155) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,25 | 6,26 | 6,27 | 6,28 | 6,29 |
| $F_{86}(x)$ | 8,686179 | 8,763808 | 8,841986 | 8,920716 | 9,000000 |

$$F_{86}(6,2571) = ?$$

$$F_{86}(6,2730) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,30 | 6,31 | 6,32 | 6,33 | 6,34 |
| $F_{87}(x)$ | 1,930908 | 1,948001 | 1,965213 | 1,982546 | 2,000000 |

$$F_{87}(6,3081) = ?$$

$$F_{87}(6,3067) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,35 | 6,36 | 6,37 | 6,38 | 6,39 |
| $F_{88}(x)$ | 7,726060 | 7,793836 | 7,862084 | 7,930804 | 8,000000 |

$$F_{88}(6,3720) = ?$$

$$F_{88}(6,3863) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,40 | 6,41 | 6,42 | 6,43 | 6,44 |
| $F_{89}(x)$ | 8,694042 | 8,769746 | 8,845972 | 8,922723 | 9,000000 |

$$F_{89}(6,4033) = ?$$

$$F_{89}(6,4386) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,45 | 6,46 | 6,47 | 6,48 | 6,49 |
| $F_{90}(x)$ | 7,730393 | 7,797109 | 7,864280 | 7,931910 | 8,000000 |

$$F_{90}(6,4515) = ?$$

$$F_{90}(6,4888) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,50 | 6,51 | 6,52 | 6,53 | 6,54 |
| $F_{91}(x)$ | 4,833000 | 4,874329 | 4,915938 | 4,957827 | 5,000000 |

$$F_{91}(6,5118) = ?$$

$$F_{91}(6,5269) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,55 | 6,56 | 6,57 | 6,58 | 6,59 |
| $F_{92}(x)$ | 7,735070 | 7,800640 | 7,866651 | 7,933103 | 8,000000 |

$$F_{92}(6,5839) = ?$$

$$F_{92}(6,5785) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,60 | 6,61 | 6,62 | 6,63 | 6,64 |
| $F_{93}(x)$ | 4,841501 | 4,880743 | 4,920240 | 4,959992 | 5,000000 |

$$F_{93}(6,6056) = ?$$

$$F_{93}(6,6069) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,65 | 6,66 | 6,67 | 6,68 | 6,69 |
| $F_{94}(x)$ | 1,937097 | 1,952672 | 1,968347 | 1,984123 | 2,000000 |

$$F_{94}(6,6534) = ?$$

$$F_{94}(6,6573) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,70 | 6,71 | 6,72 | 6,73 | 6,74 |
| $F_{95}(x)$ | 3,875194 | 3,906099 | 3,937202 | 3,968501 | 4,000000 |

$$F_{95}(6,7123) = ?$$

$$F_{95}(6,7328) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,75 | 6,76 | 6,77 | 6,78 | 6,79 |
| $F_{96}(x)$ | 4,845196 | 4,883532 | 4,922111 | 4,960933 | 5,000000 |

$$F_{96}(6,7888) = ?$$

$$F_{96}(6,7516) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,80 | 6,81 | 6,82 | 6,83 | 6,84 |
| $F_{97}(x)$ | 3,877017 | 3,907476 | 3,938125 | 3,968966 | 4,000000 |

$$F_{97}(6,8210) = ?$$

$$F_{97}(6,8322) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,85 | 6,86 | 6,87 | 6,88 | 6,89 |
| $F_{98}(x)$ | 3,877954 | 3,908182 | 3,938599 | 3,969205 | 4,000000 |

$$F_{98}(6,8641) = ?$$

$$F_{98}(6,8624) = ?$$

| | | | | | |
|-------------|----------|----------|----------|----------|----------|
| x | 6,90 | 6,91 | 6,92 | 6,93 | 6,94 |
| $F_{99}(x)$ | 8,727514 | 8,795009 | 8,862920 | 8,931250 | 9,000000 |

$$F_{99}(6,9027) = ?$$

$$F_{99}(6,9252) = ?$$

| | | | | | |
|--------------|----------|----------|----------|----------|----------|
| x | 6,95 | 6,96 | 6,97 | 6,98 | 6,99 |
| $F_{100}(x)$ | 5,819705 | 5,864367 | 5,909303 | 5,954513 | 6,000000 |

$$F_{100}(6,9668) = ?$$

$$F_{100}(6,9854) = ?$$

| | | | | | |
|--------------|----------|----------|----------|----------|----------|
| x | 7,00 | 7,01 | 7,02 | 7,03 | 7,04 |
| $F_{101}(x)$ | 1,940554 | 1,955281 | 1,970098 | 1,985004 | 2,000000 |

$$F_{101}(7,0056) = ?$$

$$F_{101}(7,0018) = ?$$

9 Задание IX

IX. С помощью численных методов найти производную функции из седьмой задачи в точке $x = 2,5$. Привести погрешность, сравнив результат с аналитическим.

10 Задание X

X. При помощи квадратурных формул Котеса ($k=2$, $k=3$, $k=4$) вычислить значение интеграла функции. Пусть номер варианта равен n , тогда $F(x)$ имеет следующий вид:

$F(x) = n \times \sin(0,2nx)$, а её значения округляются до пяти значащих цифр.

Параметры аргумента: $x_0 = 0,1n$, $\Delta x = 0,03$. Точек: 13. Результат сравнить с аналитическим.