МИНИСТЕРСТВО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ «МАМИ»

Кафедра «Высшая математика»

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МАТЕМАТИЧЕСКИЙ АНАЛИЗ
Часть 2.

Предел числовой последовательности.

Предел функции. Непрерывность функции.

Варианты расчетно-графических работ

Москва 2011

1. РАСЧЕТНО-ГРАФИЧЕСКАЯ РАБОТА ПО ТЕМЕ

«ПРЕДЕЛ ПОСЛЕДОВАТЕЛЬНОСТИ» (приложение 1)

Вариант 1.

1. $\lim\limits_{n\to\infty}\dfrac{2n^5+5(-1)^n n^3+9}{6n^5+6n^2+1}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+7)(4n+5)(7n-4)^2}{(3n-1)(2n^2-3)(1-5n)}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{5n^4+9n^3+5}+2n}{\sqrt[7]{3n^7+9n^5}+4n+1}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+1)!+n!}{(n+2)!}$ 5. $\lim\limits_{n\to\infty}\dfrac{2\cdot 5^{n+2}+3\cdot 2^{n-1}}{5^{n-1}+7\cdot 2^{n+1}}$ 6. $\lim\limits_{n\to\infty}\dfrac{1+5+5^2+\ldots+5^n}{1+3+3^2+\ldots+3^n}$ 7. $\lim\limits_{n\to\infty} n\left(\sqrt{n^2+4n-2}-n\right)$

8. $\lim\limits_{n\to\infty}\left[\sqrt[3]{(n+3)^2}-\sqrt[3]{(n-3)^2}\right]$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{n^3}{n^2-n+1}-\dfrac{n^2}{n+2}\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{1+2+3+\ldots+2n}{n+1}-n\right)$

11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{2n+1}-\cos\sqrt{2n}\right)$ 12. $\lim\limits_{n\to\infty}\left(\dfrac{1+2n}{3+2n}\right)^{\sqrt{3n+1}}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{n^2+n}{n^2+3n+1}\right)^{2n}$

14. $\lim\limits_{n\to\infty}\sin\left(\dfrac{\sqrt{n+1}}{n-1}\right)\cos\left(\dfrac{n^2+2n}{3n+4}\right)$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{4n^2+3}-2n}{\sqrt{4n+1}-\sqrt{4n+2}}$

Вариант 2.

1. $\lim\limits_{n\to\infty}\dfrac{8n^6+2\cdot(-1)^n}{5n^6-6n^5+32}$ 2. $\lim\limits_{n\to\infty}\dfrac{(5\sqrt{n}+2)^4(8n+2)^2}{2n^4+5n+33}$ 3. $\lim\limits_{n\to\infty}\dfrac{1+2+3+\ldots+3n}{\sqrt{3n^4+n}+\sqrt[3]{4n^6+7}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(2n+3)n!}{(n+1)!}$

5. $\lim\limits_{n\to\infty}\dfrac{5^{n-1}}{3\cdot 5^{n-2}+3^{n+4}}$ 6. $\lim\limits_{n\to\infty}\dfrac{1+5^{-1}+5^{-2}+\ldots+5^{-n}}{1+3^{-1}+3^{-2}+\ldots+3^{-n}}$ 7. $\lim\limits_{n\to\infty}\sqrt[3]{n}\left(\sqrt[3]{2n+4}-\sqrt[3]{2n-4}\right)$

8. $\lim\limits_{n\to\infty} n\left(\sqrt{4n^2+1}-2n\right)$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{8n^2}{4n+5}-2n\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{3n+2}{\sqrt{3n+6}}-\sqrt{3n}\right)$

11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{4\sqrt{n}+1}-\sin\sqrt{4\sqrt{n}-1}\right)$ 12. $\lim\limits_{n\to\infty} tg\dfrac{\sqrt{5n+3}}{6n+1}\sin\dfrac{n^3+6}{\sqrt{3n+4}}$

13. $\lim\limits_{n\to\infty}\left[1-\dfrac{3}{\sqrt{2n^2+n}}\right]^{3n}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{7n}+1}{\sqrt{7n}+2}\right)^{\sqrt{n+1}}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+5}-\sqrt{3n-5}}{\sqrt{n^2+2}-\sqrt{n^2-2}}$

Вариант 3.

1. $\lim\limits_{n\to\infty}\dfrac{3n^7+n^6\cos n+9}{2n^6-5n^7+\sin 9n}$ 2. $\lim\limits_{n\to\infty}\dfrac{(4n+1)^5(1-3n)^3}{(6n+1)^8-2n^8}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{2n^4+6n^3}+\sqrt[5]{3n^5+5n^2}}{9n+4}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n-1)!(n+2)!}{((n+3)!)^2}$

5. $\lim\limits_{n\to\infty}\dfrac{1+2+2^2+\ldots+2^{2n}}{2^{2n+3}}$ 6. $\lim\limits_{n\to\infty}\dfrac{3^{n+1}+5^{n+2}}{\sqrt{6\cdot 5^{2n+1}+3}}$ 7. $\lim\limits_{n\to\infty} n^{4/3}\left(\sqrt[3]{2n^2+3}-\sqrt[3]{2n^2-3}\right)$ 8. $\lim\limits_{n\to\infty}\left(2n-\sqrt{4n^2+7n+2}\right)$

9. $\lim\limits_{n\to\infty}\left(\dfrac{4n^4}{2n^2+n}-2n^2\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{1+2+3+\ldots+n}}{2n+1}-2n\right)$ 11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{n^2+2}-\sin\sqrt{n^2-2}\right)$

12. $\lim\limits_{n\to\infty} tg\dfrac{\sqrt{4n+3}+4}{\sqrt[3]{2n^5+n}+3}\cos\dfrac{\sqrt{7n^2+5}+3}{\sqrt[3]{2n^2+4n}}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{n^2+1}+2}{\sqrt{n^2+1}+4}\right)^{2n}$

14. $\lim\limits_{n\to\infty}\left(1-\dfrac{4}{5\sqrt{4n+3}}\right)^{\sqrt{2n+1}}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{n^2+2}-n}{\sqrt{n^2+3}-n}$

Вариант 4.

1. $\lim\limits_{n\to\infty}\dfrac{3n^9+4n^8+7n^3}{6n^9+32\sin n}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3n+12)^9+4n^9}{(3n+2)^6(5n+6)^4}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{5n^8+2n^6+3}-3n^2+2}{2n^2+4n+78}$ 4. $\lim\limits_{n\to\infty}\dfrac{((n-1)!)^3}{n!(n-2)!(n+1)!}$

5. $\lim\limits_{n\to\infty}\dfrac{(3\cdot5^{n-1}+2^{n-3})^2}{3\cdot5^{2n+1}+2^n}$ 6. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2\cdot7^{2n}+99}+7^{n+1}}{1+7+7^2+\ldots+7^n}$ 7. $\lim\limits_{n\to\infty}n^2\left(\sqrt[3]{3n^3+2}-\sqrt[3]{3n^3-2}\right)$ 8. $\lim\limits_{n\to\infty}\sqrt{n+2}\left(\sqrt{n+3}-\sqrt{n-3}\right)$

9. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{9n^4+2}}{n}-3n\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{n^5+n^4}{n^2+3n+2}-n^3\right)$ 11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{n^2+3}-\cos\sqrt{n^2-3}\right)$

12. $\lim\limits_{n\to\infty}\dfrac{4-(-1)^n}{2+(-1)^n}arctg\dfrac{3}{n+4}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{1+3\sqrt{n}}{2+3\sqrt{n}}\right)^{(1-n)/(1-\sqrt{n})}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{n^2+2}{n^2+1}\right)^{(n^2+1)/(n+1)}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{n^3+1}-n}{\sqrt{n^2+2}-n}$

Вариант 5.

1. $\lim\limits_{n\to\infty}\dfrac{2n^{10}-4n^3+5\cdot(-1)^n}{3n^9+5n^7+122}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n+1)^4+(3n+2)^6}{(2n+1)^4+(2n+1)^6}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{2n^6+3}-3n^2+2}{\sqrt{7n^4+2n^3+1}+n^2}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+2)!+n!}{(n+1)n!}$

5. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2\cdot3^{2n-1}+4}}{2^{n+3}-3^{n+1}}$ 6. $\lim\limits_{n\to\infty}\dfrac{2^{n+1}+3^{n-2}}{1+3^2+3^3+\ldots+3^n}$ 7. $\lim\limits_{n\to\infty}\sqrt{n}\left(\sqrt{n-\sqrt{n}}-\sqrt{n}\right)$ 8. $\lim\limits_{n\to\infty}n^2\left(\sqrt[3]{n^3+n}-\sqrt[3]{n^3-n}\right)$

9. $\lim\limits_{n\to\infty}\left(\dfrac{n+\sqrt{n+3}}{\sqrt{n}+4}-\sqrt{n}\right)$ 10. $\lim\limits_{n\to\infty}\left[\dfrac{(1+2+\ldots+2n)^2}{n}-n^3\right]$ 11. $\lim\limits_{n\to\infty}\left(\cos\sqrt[3]{7n+1}-\cos\sqrt[3]{7n}\right)$

12. $\lim\limits_{n\to\infty}\dfrac{3-\sin2n}{5+\cos3n}arctg\dfrac{\sqrt{8n+1}+6}{\sqrt[3]{n^4+n^3}}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{2n+1}}{3+\sqrt{2n+1}}\right)^{2\sqrt{n}}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{n^2+n+2}{n^2+2n+5}\right)^{2n^2}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{4n+2}-\sqrt{4n-2}}{n-\sqrt[3]{n^3+1}}$

Вариант 6.

1. $\lim\limits_{n\to\infty}\dfrac{(2-n)^3-(2+n)^5}{(2-n)^3+(2+5n)^5}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n+3)^4-5n^4}{(3n+1)^3(\sqrt{n}+2)^2}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{3n^3+1}+2\sqrt[4]{4n^4+3}}{\sqrt[3]{n^3+3}+6\sqrt[4]{n^4+n}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+2)!(n-2)!}{(n+3)!(n-1)!}$

5. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{2^{3n-2}+3^{3n}}}{2^n-5\cdot3^{n-2}}$ 6. $\lim\limits_{n\to\infty}\dfrac{\sqrt{1+3+3^2+\ldots+3^{2n}}-2^n}{3^{n-2}-2^{n-2}}$ 7. $\lim\limits_{n\to\infty}n^2\left(\sqrt{n(n^4-1)}-\sqrt{n^5+1}\right)$

8. $\lim\limits_{n\to\infty}\left(2n+\sqrt[3]{3-8n^3}\right)$ 9. $\lim\limits_{n\to\infty}\left[\dfrac{1+3+5+\ldots+(2n-1)}{n+1}-\dfrac{2n+1}{2}\right]$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{2n^3-\sqrt{n}}{2n+4}-2n^2\right)$

11. $\lim\limits_{n\to\infty}\left(\cos\sqrt[3]{n+1}-\cos\sqrt[3]{n}\right)(1+\sin n)$ 12. $\lim\limits_{n\to\infty}arctg\dfrac{\sqrt[4]{3n^4+n}}{\sqrt[5]{5n^6+5}}\sin(n!)$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{3n^3+1}{3n^3+n}\right)^{n^3+1}$

14. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt[3]{n^3+2}}{\sqrt[3]{n^3+2}+3}\right)^n$ 15. $\lim\limits_{n\to\infty}\dfrac{n-\sqrt{n^2+3n+1}}{2n-\sqrt{4n^2+1}}$

Вариант 7.

1. $\lim\limits_{n\to\infty}\dfrac{(1-3n^2+3n)^6}{(4n^3-n+7)^4}$ 2. $\lim\limits_{n\to\infty}\dfrac{(6n-2)^4}{(5n^3-2)(3\sqrt[3]{n^2}+1)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{n^5+2}-\sqrt[3]{n^6+1}}{\sqrt[5]{n^4+2}-\sqrt{n^4+1}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n-1)!-(n+1)!}{(n-1)!+(n+1)!}$

5. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3^{2n-1}+2}}{5\cdot3^{n-2}+2^n}$ 6. $\lim\limits_{n\to\infty}\dfrac{1+4+7+\ldots+(3n-2)}{\sqrt{5n^4+n+1}}$ 7. $\lim\limits_{n\to\infty}\left(\sqrt[3]{2n-8n^3}+2n\right)$

8. $\lim\limits_{n\to\infty} n^2\left(\sqrt{n^4+n^2\sqrt{n^4+n}}-\sqrt{2n^4}\right)$ 9. $\lim\limits_{n\to\infty}\left[\frac{(\sqrt{n}-1)^2}{\sqrt{n}+2}-\sqrt{n}\right]$ 10. $\lim\limits_{n\to\infty}\left[\frac{1+5+9+13+\ldots+(4n-3)}{n+1}-\frac{4n+3}{2}\right]$

11. $\lim\limits_{n\to\infty}\frac{1}{\sqrt{n}}\cos\frac{n^3+n}{n^2+3}$ 12. $\lim\limits_{n\to\infty}\left(1-\frac{n+2}{n^2}\right)^n$ 13. $\lim\limits_{n\to\infty}\cos(1-(-1)^n)arctg\frac{\sqrt{n^2+3n}}{n+\sqrt{n^3+4}}$

14. $\lim\limits_{n\to\infty}\left(\frac{n^2-3n+1}{n^2+2n+2}\right)^n$ 15. $\lim\limits_{n\to\infty}\frac{\sqrt{n^2+n}-n}{\sqrt{n+\sqrt{n}}-\sqrt{n}}$

Вариант 8.

1. $\lim\limits_{n\to\infty}\frac{7n^6-6(-1)^n n^5+7}{2n^6-8n^2+11}$ 2. $\lim\limits_{n\to\infty}\frac{(n-7)(2n+5)(3n-2)^4}{(5n^2-1)(2n-3)(1-n)^3}$ 3. $\lim\limits_{n\to\infty}\frac{\sqrt[4]{7n^4+n^3+2}-4n}{\sqrt[7]{2n^7-3n^6}-7n+2}$ 4. $\lim\limits_{n\to\infty}\frac{(n-1)!+(n+2)!}{(n+3)!}$

5. $\lim\limits_{n\to\infty}\frac{6\cdot 3^{n-3}-3\cdot 2^{n-2}}{3^{n-1}+9\cdot 2^{n+1}}$ 6. $\lim\limits_{n\to\infty}\frac{1+5+5^2+\ldots+5^{2n}}{1+3+3^2+\ldots+3^{2n}}$ 7. $\lim\limits_{n\to\infty}\left(\sqrt{n^2+\sqrt{n}}-n\right)$ 8. $\lim\limits_{n\to\infty} n\left(\sqrt[3]{(n+5)^2}-\sqrt[3]{(n-5)^2}\right)$

9. $\lim\limits_{n\to\infty}\left(\frac{n^3}{n^2-2n+2}-\frac{n^2}{n+3}\right)$ 10. $\lim\limits_{n\to\infty}\left(\frac{1+2+3+\ldots+2n}{2n+1}-3n\right)$ 11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{n+6}-\cos\sqrt{n}\right)\sin\frac{n\pi}{2}$

12. $\lim\limits_{n\to\infty}\left(\frac{1-5n}{2-5n}\right)^{3n+1}$ 13. $\lim\limits_{n\to\infty}\left(\frac{2n^2}{2n^2+n-1}\right)^{3n}$ 14. $\lim\limits_{n\to\infty}\sin\left(\frac{\sqrt{n}}{2n+\sqrt{n}}\right)\cos\left(\frac{n^2+2}{4n+5}\right)$ 15. $\lim\limits_{n\to\infty}\frac{\sqrt{4n^2+3}-2n}{\sqrt{n+1}-\sqrt{n+2}}$

Вариант 9.

1. $\lim\limits_{n\to\infty}\frac{6n^6+\cos(n^3)}{3n^6-2^4+9}$ 2. $\lim\limits_{n\to\infty}\frac{(2\sqrt{n}+3)^2(4\sqrt{n}-1)}{5n^2-11n+39}$ 3. $\lim\limits_{n\to\infty}\frac{1+2+3+\ldots+2n}{\sqrt{n^4+2}-\sqrt[3]{3n^6+4}}$ 4. $\lim\limits_{n\to\infty}\frac{(n^2+2)n!}{(n+2)!}$

5. $\lim\limits_{n\to\infty}\frac{2\cdot 7^{n-1}}{3\cdot 7^{n+1}-3^{n+4}}$ 6. $\lim\limits_{n\to\infty}\frac{1+5^{-1}+5^{-2}+\ldots+5^{-n}}{1+2^{-1}+2^{-2}+\ldots+2^{-n}}$ 7. $\lim\limits_{n\to\infty} n\left(\sqrt[3]{n^2+3}-\sqrt[3]{n^2-3}\right)$ 8. $\lim\limits_{n\to\infty} n\left(\sqrt{9n^2+5}-3n\right)$

9. $\lim\limits_{n\to\infty}\left(\frac{2n^2+1}{2n+3}-n\right)$ 10. $\lim\limits_{b\to\infty}\left(\frac{n+2}{\sqrt{2n-3}}-\sqrt{2n}\right)$ 11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{3\sqrt{n}+1}-\sin\sqrt{3\sqrt{n}-1}\right)$ 12. $\lim\limits_{n\to\infty} tg\frac{\sqrt{2n-1}}{4n+1}\sin\frac{4n+2}{\sqrt{n+7}}$

13. $\lim\limits_{n\to\infty}\left[1-3(2n^2-1)^{-1/2}\right]^{3n}$ 14. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{6n+3}-1}{\sqrt{6n+3}}\right)^{\sqrt{n+2}}$ 15. $\lim\limits_{n\to\infty}\frac{\sqrt{3n+1}-\sqrt{3n-1}}{\sqrt{n^2-2}-\sqrt{n^2+2}}$

Вариант 10.

1. $\lim\limits_{n\to\infty}\frac{2n^7+n^5\sin(n+1)+12}{3n^7-11n^8+110}$ 2. $\lim\limits_{n\to\infty}\frac{(n+2)^6(1-3n)^3}{(2n+1)^9}$ 3. $\lim\limits_{n\to\infty}\frac{\sqrt[4]{4n^4+n^3}+\sqrt[5]{7n^5+4n^2}}{8n+31}$ 4. $\lim\limits_{n\to\infty}\frac{(n+1)!(n+2)!}{((n+3)!)^2}$

5. $\lim\limits_{n\to\infty}\frac{1+2+2^2+\ldots+2^n}{2^{n+3}}$ 6. $\lim\limits_{n\to\infty}\frac{3^{n+1}+7^{n+2}}{\sqrt{7^{2n-1}+6}}$ 7. $\lim\limits_{n\to\infty} n^{4/3}\left(\sqrt[3]{n^2+n}-\sqrt[3]{n^2-n}\right)$ 8. $\lim\limits_{n\to\infty}\left(\sqrt{7}n-\sqrt{7n^2+n+6}\right)$

9. $\lim\limits_{n\to\infty}\left(\frac{3n^4+n}{3n^2+1}-n^2\right)$ 10. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{1+2+3+\ldots+n}}{n+1}-n\right)$ 11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{n^4+1}-\sin n^2\right)$

12. $\lim\limits_{n\to\infty} tg\frac{\sqrt{n+2}-1}{\sqrt[3]{3n^5-n}+2}\sin\frac{\sqrt{n+1}+n}{\sqrt[3]{n^2+3}}$ 13. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{2n^2+1}+2}{\sqrt{2n^2+1}+1}\right)^{3n}$ 14. $\lim\limits_{n\to\infty}\left(1-\frac{1}{3\sqrt{2n-1}}\right)^{\sqrt{4n+5}}$

15. $\lim\limits_{n\to\infty}\frac{\sqrt{9n^2+3}-3n}{\sqrt{n^2+1}-n}$

Вариант 11.

1. $\lim\limits_{n\to\infty}\dfrac{3n^9-6n^7+\cos n}{2n^8+n^7+\cos 4n}$ 2. $\lim\limits_{n\to\infty}\dfrac{(4n+1)^9-7n^9}{(2n+3)^6(1-2n)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[5]{3n^{10}+n^5}-2n^2}{5n^2+n+8}$ 4. $\lim\limits_{n\to\infty}\dfrac{((n+1)!)^3}{n!(n-2)!(n+2)!}$

5. $\lim\limits_{n\to\infty}\dfrac{(4\cdot 3^{n+2}-2^{n-3})^2}{2\cdot 3^{2n+1}+2^n}$ 6. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5\cdot 2^{2n}+39}}{1+2+2^2+\ldots+2^n}$ 7. $\lim\limits_{n\to\infty} n^2\left(\sqrt[3]{n^3+7}-\sqrt[3]{n^3-7}\right)$

8. $\lim\limits_{n\to\infty}\sqrt{n+4}\left(\sqrt{n+1}-\sqrt{n+5}\right)$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{4n^4+2}}{2n}-n\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{n^5+2n^4}{n^2+n+5}-n^3\right)$

11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{\sqrt{n^3}+1}-\sin\sqrt{\sqrt{n^3}-1}\right)$ 12. $\lim\limits_{n\to\infty}\dfrac{5-(-1)^n}{3+(-1)^n}\arcsin\dfrac{\sqrt{n+1}}{n+2}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{1-4\sqrt{n}}{3-4\sqrt{n}}\right)^{(1-n)/(1-\sqrt{n})}$

14. $\lim\limits_{n\to\infty}\left(\dfrac{n^2}{n^2+3}\right)^{(n^2+4)/(n+2)}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{8n^3+3}-2n}{\sqrt{n^2+1}-n}$

Вариант 12.

1. $\lim\limits_{n\to\infty}\dfrac{5n^8+(-1)^n n^5+9}{2n^8+3n^4+8}$ 2. $\lim\limits_{n\to\infty}\dfrac{(7n+3)^4+(7n+1)^2}{(2n+1)^4+(2n^3+7)^2}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{5n^8+3}+2^2+62}{\sqrt{3n^4+2n^3+1}-n^2+n}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+1)!+n!}{(n+2)n!}$

5. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5\cdot 3^{2n-1}+3}}{2^{n+1}+3^{n-2}}$ 6. $\lim\limits_{n\to\infty}\dfrac{3^{n+1}+2^{2n-1}}{1+3^2+3^3+\ldots+3^n}$ 7. $\lim\limits_{n\to\infty}\sqrt{n}\left(\sqrt{n+\sqrt{13n}}-\sqrt{n}\right)$

8. $\lim\limits_{n\to\infty} n^2\left(\sqrt[3]{n^3+9}-\sqrt[3]{n^3-9}\right)$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{n+\sqrt{n+1}}{\sqrt{n}+2}-\sqrt{n}\right)$ 10. $\lim\limits_{n\to\infty}\left[\dfrac{(1+2+\ldots+n)^2}{n}-n^3\right]$

11. $\lim\limits_{n\to\infty}\left(\cos\sqrt[3]{2n+1}-\cos\sqrt[3]{2n}\right)$ 12. $\lim\limits_{n\to\infty}\dfrac{3+\cos 3n}{6+\cos 5n}\,arctg\dfrac{\sqrt{2n+1}+4}{\sqrt[4]{4n^5+n}}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{3n+1}}{2+\sqrt{3n+1}}\right)^{3\sqrt{n}}$

14. $\lim\limits_{n\to\infty}\left(\dfrac{n^2+n+3}{n^2+5n+1}\right)^{3n^2}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+2}-\sqrt{3n-2}}{n-\sqrt[3]{n^3+1}}$

Вариант 13.

1. $\lim\limits_{n\to\infty}\dfrac{(1-2n)^4+(1+2n)^6}{(1-2n)^4-(1+6n)^6}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n+3)^4-3n^4}{(3n-1)^3(\sqrt{n}-2)^2}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{7n^3+1}-2\sqrt[4]{n^4+n}}{\sqrt[3]{n^3+2}+6\sqrt[4]{n^4+3}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+2)!(n-2)!}{[(n+1)!]^2}$

5. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{5^{3n-1}+3^{3n}}}{2^n+7\cdot 5^{n+2}}$ 6. $\lim\limits_{n\to\infty}\dfrac{\sqrt{1+3+3^2+\ldots+3^{2n}}+3^n}{5\cdot 3^{n+1}+7\cdot 2^{n-1}}$ 7. $\lim\limits_{n\to\infty} n^2\left(\sqrt{n(n^4+2)}-\sqrt{n^5-2}\right)$

8. $\lim\limits_{n\to\infty}(n+\sqrt[3]{9-n^3})$ 9. $\lim\limits_{n\to\infty}\left[\dfrac{n+(n+1)+(n+2)+\ldots+2n}{n+1}-n\right]$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{n^3-2\sqrt{n}}{n+4}-n^2\right)$

11. $\lim\limits_{n\to\infty}\left(\cos\sqrt[3]{n+3}-\cos\sqrt[3]{n}\right)(1+\cos n\pi)$ 12. $\lim\limits_{n\to\infty} arctg\dfrac{\sqrt[5]{2n^5-3}}{\sqrt[6]{8n^7+n}}\cos^4(n!)$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{3-4n^3}{5-4n^3}\right)^{n^3-1}$

14. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt[3]{2n^3+2}}{\sqrt[3]{2n^3+2}+4}\right)^n$ 15. $\lim\limits_{n\to\infty}\dfrac{n-\sqrt{n^2-n+3}}{2n-\sqrt{4n^2+n+1}}$

Вариант 14.

1. $\lim\limits_{n\to\infty}\dfrac{3n^3+\sqrt{n^3+4}}{n^3-4n+\sin(n+2)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3n^2-1)^2}{(\sqrt{n}-1)^4(4\sqrt{n}-1)^4}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[5]{3-n^5}-\sqrt[3]{4n^2+1}}{\sqrt[6]{2n^4+4}-\sqrt{n^3-1}}$ 4. $\lim\limits_{n\to\infty}\dfrac{n!+(n+1)!+(n+2)!}{(n+3)!}$

5. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{27^n+2}}{4\cdot 3^{n+2}+1}$ 6. $\lim\limits_{n\to\infty}\dfrac{5\cdot 4^{n-2}+3^n}{\sqrt{1+2+4+\ldots+2^n}}$ 7. $\lim\limits_{n\to\infty}\left[n^{4/3}-(n^2-3)^{2/3}\right]$ 8. $\lim\limits_{n\to\infty}n^3\left(\sqrt{n^2+\sqrt{n^4+3}}-\sqrt{2}n\right)$

9. $\lim\limits_{n\to\infty}\left(\dfrac{3n+1}{1+2+\ldots+n}-\dfrac{2}{3}\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{n}+1}{\sqrt[4]{n}+2}-\sqrt[4]{n}\right)$ 11. $\lim\limits_{n\to\infty}\sin\dfrac{3+(-1)^n}{5-(-1)^n}arctg\dfrac{\sqrt{7n+6}}{5n+1}$ 12. $\lim\limits_{n\to\infty}\left(\dfrac{2n^2-1}{2n^2}\right)^{n^4}$

13. $\lim\limits_{n\to\infty}\sin(n+3)\left(\sin\sqrt{n+3}-\sin\sqrt{n+4}\right)$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{n+2}+1}{\sqrt{n+2}+3}\right)^{\sqrt{3n+2}}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{n^2+1}-\sqrt{n^2-1}}{\sqrt[3]{1-8n^3}+2n}$

Вариант 15.

1. $\lim\limits_{n\to\infty}\dfrac{5n^8-9(-1)^n n^4-7}{4n^9-6^2+11}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n-3)(n+5)(4n-2)^4}{(3n-1)(2n-1)(1-7n)^4}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[6]{3n^4-n^3+5}-4n}{3\sqrt[7]{2n^7-n^5}+4n}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+3)!+(n-3)!}{(n+2)!}$

5. $\lim\limits_{n\to\infty}\dfrac{7\cdot 9^{n-1}-3\cdot 2^{n-1}}{3^{2n+1}+7\cdot 2^{n+2}}$ 6. $\lim\limits_{n\to\infty}\dfrac{1+5+5^2+\ldots+5^n}{1+2+2^2+\ldots+2^n}$ 7. $\lim\limits_{n\to\infty}n(2n-\sqrt{4n^2+7n+2})$

8. $\lim\limits_{n\to\infty}n\left(\sqrt[3]{(n-6)^2}-\sqrt[3]{(n+6)^2}\right)$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{n^3}{n^2-3n+1}-\dfrac{n^2}{n+2}\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{1+2+3+\ldots+2n}{n+2}-3n\right)$

11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{n}-\cos\sqrt{n+8}\right)\cos\sqrt{n}$ 12. $\lim\limits_{n\to\infty}\left(\dfrac{1-3\sqrt{n}}{6-3\sqrt{n}}\right)^{2n-1}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{n^2+n}{n^2+3n-1}\right)^n$

14. $\lim\limits_{n\to\infty}\sin\left(\dfrac{\sqrt{n+1}}{n+2\sqrt{n}}\right)\cos\left(\dfrac{n^4}{n^2+1}\right)$ 15. $\lim\limits_{n\to\infty}\dfrac{3n-\sqrt{9n^2+8}}{\sqrt{n+2}-\sqrt{n-2}}$

Вариант 16.

1. $\lim\limits_{n\to\infty}\dfrac{3n^6+3n^5+\sin n}{2n^6-5n^5+9}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3\sqrt{n}+2)^2(4n-1)}{2n^2-26n-4}$ 3. $\lim\limits_{n\to\infty}\dfrac{1+2+3+\ldots+3n}{\sqrt{n^4+n}-\sqrt[3]{7n^6+2}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+2)!}{(n^2+1)n!}$

5. $\lim\limits_{n\to\infty}\dfrac{2\cdot 7^{n+1}}{3\cdot 7^{n-1}+2^{n+4}}$ 6. $\lim\limits_{n\to\infty}\dfrac{1+7^{-1}+7^{-2}+\ldots+7^{-n}}{1+11^{-1}+11^{-2}+\ldots+11^{-n}}$ 7. $\lim\limits_{n\to\infty}\sqrt[3]{n}\left(\sqrt[3]{n+2}-\sqrt[3]{n-2}\right)$

8. $\lim\limits_{n\to\infty}n\left(3n-\sqrt{9n^2+n}\right)$ 9. $\lim\limits_{n\to\infty}\left(n-\dfrac{2n^2+1}{2n+1}\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{1-4n}{2\sqrt{n}+3}+2\sqrt{n}\right)$ 11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{2\sqrt{n}+1}-\sin\sqrt{2\sqrt{n}-1}\right)$

12. $\lim\limits_{n\to\infty}tg\dfrac{\sqrt{3n-1}}{4n+1}\sin\dfrac{4-2n}{\sqrt{n+1}}$ 13. $\lim\limits_{n\to\infty}\left[1-2(3n^2-1)^{-1/2}\right]^{2n}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{6n+3}-2}{\sqrt{6n+3}}\right)^{\sqrt{n+1}}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{n+2}-\sqrt{n-2}}{\sqrt{n^2-6}-\sqrt{n^2+6}}$

Вариант 17.

1. $\lim\limits_{n\to\infty}\dfrac{3n^7-4n^5+33}{11n^7-n^4+30\cdot(-1)^n}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n+4)^6(1-n^5)}{(5n+1)^{10}}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{4n^8+n^3}+\sqrt[5]{6n^5+2n^2}}{7n^2+3222n+4668}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+2)!(n+4)!}{((n+5)!)^2}$

5. $\lim\limits_{n\to\infty}\dfrac{1+5+5^2+\ldots+5^n}{25^{n-1}}$ 6. $\lim\limits_{n\to\infty}\dfrac{2^{n+2}+5^{n-2}}{\sqrt{5^{2n-1}+3}}$ 7. $\lim\limits_{n\to\infty}n^{4/3}\left(\sqrt[3]{n^2+5}-\sqrt[3]{n^2-5}\right)$ 8. $\lim\limits_{n\to\infty}\left(\sqrt{3n^2+5n+3}-\sqrt{3}n\right)$

9. $\lim\limits_{n\to\infty}\left(\frac{3n^4+1}{3n^2+1}-n^2\right)$ 10. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{1+2+3+...+3n}}{n+1}-n\right)$ 11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{n^2+2}-\cos n\right)$

12. $\lim\limits_{n\to\infty} tg\frac{\sqrt{n}}{\sqrt[3]{4n^4-n}+2}\sin\frac{\sqrt{n^2+1}}{\sqrt[3]{n^2+1}}$ 13. $\lim\limits_{n\to\infty}\left(\frac{2\sqrt{n^2+3}+3}{2\sqrt{n^2+3}+1}\right)^{2n}$ 14. $\lim\limits_{n\to\infty}\left(1-\frac{3}{4\sqrt{2n-3}}\right)^{\sqrt{4n+1}}$ 15. $\lim\limits_{n\to\infty}\frac{n-\sqrt{n^2+2}}{\sqrt{4n^2+4}-2n}$

Вариант 18.

1. $\lim\limits_{n\to\infty}\frac{2n^8-3n^5+1}{6n^9+(-1)^n\cdot n^7+3}$ 2. $\lim\limits_{n\to\infty}\frac{(2n+3)^9+6n^9}{(3n+4)^6(3-n)^3}$ 3. $\lim\limits_{n\to\infty}\frac{\sqrt[4]{8n^8+n^6+2}-3n^2+1}{7n^2+45n-85}$ 4. $\lim\limits_{n\to\infty}\frac{((n+3)!)^3}{n!(n+1)!(n+2)!}$

5. $\lim\limits_{n\to\infty}\frac{(3\cdot5^{n+2}-3^{n-3})^2}{3\cdot25^{n-1}+2^n}$ 6. $\lim\limits_{n\to\infty}\frac{\sqrt{4\cdot9^n+3}}{1+3+3^2+...+3^n}$ 7. $\lim\limits_{n\to\infty}n^2\left(\sqrt[3]{n^3-n}-\sqrt[3]{n^3+n}\right)$ 8. $\lim\limits_{n\to\infty}\sqrt{n+2}\left(\sqrt{n+1}-\sqrt{n+8}\right)$

9. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{4n^4+3}}{2n+7}-n\right)$ 10. $\lim\limits_{n\to\infty}\left(\frac{n^5-n^3}{n^2+2n+5}-n^3\right)$ 11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{3n^2+2}-\sin\sqrt{3}n\right)$

12. $\lim\limits_{n\to\infty}\frac{3-(-1)^n}{9-(-1)^n}\arcsin\frac{\sqrt{n+3}}{n+1}$ 13. $\lim\limits_{n\to\infty}\left(\frac{2-\sqrt{n}}{7-\sqrt{n}}\right)^{(1+n)/(1+\sqrt{n})}$ 14. $\lim\limits_{n\to\infty}\left(\frac{2n^2}{2n^2+1}\right)^{(n^2+3)/(n+1)}$ 15. $\lim\limits_{n\to\infty}\frac{n-\sqrt[3]{n^3+2}}{\sqrt{9n^2+6}-3n}$

Вариант 19.

1. $\lim\limits_{n\to\infty}\frac{4n^8+7n^6\cdot\sin n+19}{7n^8+88n^6+98}$ 2. $\lim\limits_{n\to\infty}\frac{(2n+3)^4+(6n+1)^4}{(6n+5)^4+(3n+7)^4}$ 3. $\lim\limits_{n\to\infty}\frac{\sqrt[4]{3n^8+5}-2n^2+7}{\sqrt{5n^4-n^3+1}-n^2+2}$ 4. $\lim\limits_{n\to\infty}\frac{(n+3)!-n!}{(n+4)n!}$

5. $\lim\limits_{n\to\infty}\frac{\sqrt{5\cdot9^{n-2}+4}}{2^{n+2}+3^{n-1}}$ 6. $\lim\limits_{n\to\infty}\frac{4\cdot5^{n-2}+2^{2n-1}}{1+5^2+5^3+...+5^n}$ 7. $\lim\limits_{n\to\infty}\sqrt{n+1}\left(\sqrt{n}-\sqrt{n+\sqrt{11n}}\right)$

8. $\lim\limits_{n\to\infty}n^2\left(\sqrt[3]{n^3-n}-\sqrt[3]{n^3+n}\right)$ 9. $\lim\limits_{n\to\infty}\left(\sqrt{n}-\frac{n}{\sqrt{n}+4}\right)$ 10. $\lim\limits_{n\to\infty}\left[\frac{(1+2+...+2n)^2}{n+4}-n^3\right]$

11. $\lim\limits_{n\to\infty}\left(\sin\sqrt[3]{n^3-9}-\sin n\right)$ 12. $\lim\limits_{n\to\infty}\frac{5-\cos5n}{4+\sin n}tg\frac{\sqrt{n+2}+1}{\sqrt[4]{6n^5+2}}$ 13. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{7n+1}}{4+\sqrt{7n+1}}\right)^{2\sqrt{n}}$

14. $\lim\limits_{n\to\infty}\left(\frac{n^2+4n}{n^2+3n+1}\right)^{2n^2}$ 15. $\lim\limits_{n\to\infty}\frac{\sqrt{4n+2}-\sqrt{4n-2}}{n-\sqrt[3]{n^3+2}}$

Вариант 20.

1. $\lim\limits_{n\to\infty}\frac{(1-3n)^3+(1+2n)^4}{(1-3n)^3-(1+3n)^4}$ 2. $\lim\limits_{n\to\infty}\frac{(3n+2)^3}{(2\sqrt{n}-1)^4(\sqrt{n}-7)^2}$ 3. $\lim\limits_{n\to\infty}\frac{\sqrt[3]{2n^3+n}-6\sqrt[4]{n^4+3}}{\sqrt[3]{n^3+7}+3\sqrt[4]{n^4+3}}$ 4. $\lim\limits_{n\to\infty}\frac{(n+3)!(n-3)!}{[(n+2)!]^2}$

5. $\lim\limits_{n\to\infty}\frac{\sqrt[3]{7^{3n-1}+3^{3n}}}{3^n+4\cdot7^{n+1}}$ 6. $\lim\limits_{n\to\infty}\frac{\sqrt{1+3+3^2+...+3^{2n}}+2^n}{6\cdot3^{n+2}+7\cdot2^{n-1}}$ 7. $\lim\limits_{n\to\infty}n^2\left(\sqrt{n(n^4+7)}-\sqrt{n^5-7}\right)$

8. $\lim\limits_{n\to\infty}\left(2n+\sqrt[3]{n-8n^3}\right)$ 9. $\lim\limits_{n\to\infty}\left[\frac{n+(n+1)+(n+2)+...+6n}{n+2}-n\right]$ 10. $\lim\limits_{n\to\infty}\left(\frac{n^3-\sqrt{n}}{n+5}-n^2\right)$

11. $\lim\limits_{n\to\infty}\left(\sin\sqrt[3]{n^2-7}-\sin\sqrt[3]{n^2}\right)(1+(-1)^n)$ 12. $\lim\limits_{n\to\infty}arctg\frac{\sqrt[5]{9n^5-2}}{\sqrt[6]{8n^7+n}}\cos^7(n!)$ 13. $\lim\limits_{n\to\infty}\left(\frac{3-5n^3}{2-5n^3}\right)^{n^3+2}$

14. $\lim\limits_{n\to\infty}\left(\dfrac{2\sqrt[3]{n^3+4}}{2\sqrt[3]{n^3+4}+1}\right)^{2n}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{9n^2-5n+1}-3n}{2n-\sqrt{4n^2+8n+1}}$

Вариант 21.

1. $\lim\limits_{n\to\infty}\dfrac{(6n+1)(n-2)(2n+3)^3}{(3n-1)(n+3)(5n-2)^3}$ 2. $\lim\limits_{n\to\infty}\dfrac{(4n-1)^2}{(\sqrt{2n}-1)^2(3\sqrt[3]{n}-1)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{(\sqrt{4n+1}+\sqrt{2n-2})^2}{3n-2}$

4. $\lim\limits_{n\to\infty}\dfrac{(n+1)!+(n+2)!-(n+3)!}{(n+4)!}$ 5. $\lim\limits_{n\to\infty}\dfrac{2\cdot3^{n+1}+2^{2n-1}}{5\cdot3^{n-1}+3\cdot2^{2n+1}}$ 6. $\lim\limits_{n\to\infty}\left(\dfrac{1}{n^2}+\dfrac{2}{n^2}+\dfrac{3}{n^2}+\ldots+\dfrac{2(n-1)}{n^2}\right)$

7. $\lim\limits_{n\to\infty}\left(\sqrt{n}-\sqrt{n+\sqrt{n+2}}\right)$ 8. $\lim\limits_{n\to\infty}n\left(\sqrt{16n^2+7n+1}-4n\right)$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{1+3+5+\ldots+(2n-1)}{n+2}-\dfrac{2n-1}{2}\right)$

10. $\lim\limits_{n\to\infty}\left(\dfrac{2n^2-n}{3n-2}+\dfrac{6n^3+1}{1-9n^2}\right)$ 11. $\lim\limits_{n\to\infty}\sin\dfrac{6+\cos n}{3-(-1)^n}\sin\dfrac{\sqrt{3n+6}}{2n+5}$ 12. $\lim\limits_{n\to\infty}\left(\dfrac{n^3+4}{n^3-3}\right)^{n-2n^3}$

13. $\lim\limits_{n\to\infty}(\sqrt{n+3}-\sqrt{n+1})\cos\dfrac{\pi n}{2}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{n+5}+1}{\sqrt{n+5}+3}\right)^{\sqrt{2n+3}}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{n^2+4n+1}-\sqrt{n^2-n+3}}{\sqrt[3]{1-n^3}+n}$

Вариант 22.

1. $\lim\limits_{n\to\infty}\dfrac{2n^{13}-3(-1)^n n^{12}-8}{5n^{13}-12n^{10}+1213}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n-5)(2n+4)(4n-6)^3}{(3n-1)(2n-4)(1-6n)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[6]{5n^4-2n^2+4}-n}{2\sqrt[7]{2n^7-n^3}-9n^2-2}$ 4. $\lim\limits_{n\to\infty}\dfrac{(2n)!}{[(n)!]^2}$

5. $\lim\limits_{n\to\infty}\dfrac{7\cdot9^{n+1}-5\cdot2^{n-1}}{3^{2n+2}+3\cdot2^{n+3}}$ 6. $\lim\limits_{n\to\infty}\dfrac{1+6+6^2+\ldots+6^n}{1+4+4^2+\ldots+4^n}$ 7. $\lim\limits_{n\to\infty}(n+1)\left(n-\sqrt{n^2+4n+9}\right)$

8. $\lim\limits_{n\to\infty}n\left(\sqrt[3]{(n-5)^2}-\sqrt[3]{(n+5)^2}\right)$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{n^3+n}{n^2-4n+1}-\dfrac{n^2}{n+1}\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{1+2+3+\ldots+4n}{n+2}-n\right)$

11. $\lim\limits_{n\to\infty}\left(\cos n-\cos\sqrt{n^2+12}\right)$ 12. $\lim\limits_{n\to\infty}\left(\dfrac{1-3\sqrt{n}}{5-3\sqrt{n}}\right)^{2n-1}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{n^2+2n}{n^2+3n-1}\right)^{2n}$

14. $\lim\limits_{n\to\infty}tg\left(\dfrac{\sqrt{n+9}}{n+4\sqrt{n}}\right)\cos\left(\dfrac{n^5+1}{n^2+2}\right)$ 15. $\lim\limits_{n\to\infty}\dfrac{3n-\sqrt{9n^2+1}}{\sqrt{n+1}-\sqrt{n+2}}$

Вариант 23.

1. $\lim\limits_{n\to\infty}\dfrac{5n^8+n^3\cdot\sin3n+87}{3n^7+8n^6+99}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2-5\sqrt{n})^2(2n-7)^3}{n^4+67n^3-318}$ 3. $\lim\limits_{n\to\infty}\dfrac{1+2+3+\ldots+4n}{\sqrt{n^4+3}+\sqrt[3]{4n^6-2}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+1)!}{(2n-1)n!}$

5. $\lim\limits_{n\to\infty}\dfrac{14^{n+1}}{3\cdot7^{2n-1}+5^n}$ 6. $\lim\limits_{n\to\infty}\dfrac{1+2^{-1}+2^{-2}+\ldots+2^{-n}}{1+10^{-1}+10^{-2}+\ldots+10^{-n}}$ 7. $\lim\limits_{n\to\infty}\left(\sqrt[3]{n-\sqrt{n}}-\sqrt[3]{n+\sqrt{n}}\right)$ 8. $\lim\limits_{n\to\infty}n\left(2n-\sqrt{4n^2+n}\right)$

9. $\lim\limits_{n\to\infty}\left(n-\dfrac{7n^2+n}{7n+4}\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{1-5n}{\sqrt{5n}+2}+\sqrt{5n}\right)$ 11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{9n^2+1}-\sin\sqrt{9n^2-1}\right)$ 12. $\lim\limits_{n\to\infty}tg\dfrac{\sqrt{n-1}}{n+\sqrt{n}}\cos\dfrac{3n}{\sqrt{n+3}}$

13. $\lim\limits_{n\to\infty}\left[1-3(2n^2-1)^{-1/2}\right]^{3n}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{3n}-3}{\sqrt{3n}+5}\right)^{\sqrt{2n+4}}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n+1}-\sqrt{2n-1}}{\sqrt{n^2+2n-5}-\sqrt{n^2+2n+5}}$

Вариант 24.

1. $\lim\limits_{n\to\infty}\dfrac{5n^9-n^5+39n^4}{4n^9-7n^4\cdot\cos 9n+2}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3n+4)^7(1-2n^2)^2}{(4n+1)^{10}+2n^{10}}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{2n^8+n^3}+3\sqrt[5]{6n^5+2}}{7n^2+82n+2968}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n-6)!(n-4)!}{((n-5)!)^2}$

5. $\lim\limits_{n\to\infty}\dfrac{1+5+5^2+...+5^{2n}}{25^{n-2}}$ 6. $\lim\limits_{n\to\infty}\dfrac{2^{2n+1}-5^{n-2}}{\sqrt{7\cdot 5^{2n-1}+2}+3\cdot 5^{n-1}}$ 7. $\lim\limits_{n\to\infty}n^{4/3}\left(\sqrt[3]{n^2-13}-\sqrt[3]{n^2+13}\right)$

8. $\lim\limits_{n\to\infty}(\sqrt{5}n-\sqrt{5n^2+6n+1})$ 9. $\lim\limits_{n\to\infty}\left(n^2-\dfrac{2n^4+1}{2n^2+3}\right)$ 10. $\lim\limits_{n\to\infty}\left(n-\dfrac{\sqrt{1+2+3+...+3n}}{n+4}\right)$

11. $\lim\limits_{n\to\infty}\left(\sin\sqrt{n^{3/2}-1}-\sin\sqrt{n^{3/2}+1}\right)(1+\sin n^6)$ 12. $\lim\limits_{n\to\infty}tg\dfrac{\sqrt{n+3}-5}{\sqrt[3]{n^5-1}+2}\cos\dfrac{\sqrt{n^2+1}+\sqrt{3n}}{\sqrt[3]{5n^2+2}}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{n^2+2}+3}{\sqrt{n^2+2}+1}\right)^{3n}$

14. $\lim\limits_{n\to\infty}\left(1-\dfrac{2}{7\sqrt{6n-1}}\right)^{\sqrt{2n+1}}$ 15. $\lim\limits_{n\to\infty}\dfrac{2n-\sqrt{4n^2+2}}{\sqrt{n^2+3}-n}$

Вариант 25.

1. $\lim\limits_{n\to\infty}\dfrac{4n^4-\sin(n+1)}{2n^4+13n^2+23}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n+1)^9}{(3n^2+2)^3(3-2n)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{5n^8-n^6+2}-2n^2}{5n^3+54n-38}$ 4. $\lim\limits_{n\to\infty}\dfrac{((n+3)!)^3}{[n!]^2(n+2)!}$

5. $\lim\limits_{n\to\infty}\dfrac{(2\cdot 5^{n+1}+3^{n-2})^2}{6\cdot 25^{n-1}+4^n}$ 6. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2\cdot 9^{n+2}+3}-4\cdot 3^{n-1}}{1+3+3^2+...+3^n}$ 7. $\lim\limits_{n\to\infty}n^2\left(\sqrt[3]{n^3-2n}-\sqrt[3]{n^3+2n}\right)$

8. $\lim\limits_{n\to\infty}\sqrt{n+3}\left(\sqrt{2n-1}-\sqrt{2n+8}\right)$ 9. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{9n^4+2}}{3n+1}-n\right)$ 10. $\lim\limits_{n\to\infty}\left(\dfrac{n^5-n^4+2}{n^2+2n+2}-n^3\right)$

11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{n^3-n}-\cos\sqrt{n^3+n}\right)$ 12. $\lim\limits_{n\to\infty}\dfrac{4+(-1)^n}{2+(-1)^n}\sin\dfrac{\sqrt{n}}{n+1}$

13. $\lim\limits_{n\to\infty}\left(\dfrac{4-\sqrt{n}}{2-\sqrt{n}}\right)^{(1-n)/(1-\sqrt{n})}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{n^2+1}{n^2+4}\right)^{(n^2+1)/(2n+1)}$ 15. $\lim\limits_{n\to\infty}\dfrac{n-\sqrt[3]{n^3+7}}{\sqrt{n^2+8}-n}$

Вариант 26.

1. $\lim\limits_{n\to\infty}\dfrac{13n^7-27n^8+5}{4n^8+4n^5\sin(n!)+8}$ 2. $\lim\limits_{n\to\infty}\dfrac{(1-2n)^4\cdot(7n+1)^5-3n^5}{(1+7n)^4\cdot(3n+6)^5}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{3n^8+1}-4n^2+7}{4\sqrt{2n^4-n^3+2}+n^2}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n-1)!+n!}{(n-4)n!}$

5. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3\cdot 9^{n-1}+4}}{2^{n+2}+3^n}$ 6. $\lim\limits_{n\to\infty}\dfrac{7\cdot 5^{n-3}-2^{2n}}{1+5^2+5^3+...+5^n}$ 7. $\lim\limits_{n\to\infty}\left(\sqrt{n+1}-\sqrt{n+\sqrt{17n}}\right)$ 8. $\lim\limits_{n\to\infty}n^2\left(\sqrt[3]{n-n^3}+\sqrt[3]{n+n^3}\right)$

9. $\lim\limits_{n\to\infty}\left(\sqrt{n}-\dfrac{n-\sqrt{n}}{\sqrt{n}+2}\right)$ 10. $\lim\limits_{n\to\infty}\left[\dfrac{(1+2+...+2n)^2}{n+3}-n^3\right]$ 11. $\lim\limits_{n\to\infty}\left(\cos\sqrt[3]{n^2-18}-\cos\sqrt[3]{n^2}\right)$

12. $\lim\limits_{n\to\infty}\dfrac{6-\cos 4n}{3-\cos 8n}arctg\dfrac{\sqrt{n+3}+n}{\sqrt[4]{n^7+1}}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{\sqrt{3n+1}}{5+\sqrt{3n+1}}\right)^{4\sqrt{n}}$ 14. $\lim\limits_{n\to\infty}\left(\dfrac{2n^2+3n}{2n^2+4n+1}\right)^{5n^2}$ 15. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5n+1}-\sqrt{5n-1}}{n-\sqrt[3]{n^3+7}}$

Вариант 27.

1. $\lim\limits_{n\to\infty}\dfrac{(1-3n)^3+(1+3n)^4}{(1-2n)^3-(1+2n)^4}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+4)^2}{(2\sqrt{n}-1)(\sqrt{n}-7)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{2-3n^3}-5\sqrt[4]{n^4+2}}{\sqrt[3]{n^3+n}+4\sqrt[4]{n^4+1}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(n+1)!(n-2)!}{(n+2)!(n-1)!}$

5. $\lim\limits_{n\to\infty}\frac{\sqrt[3]{3\cdot 7^{3n-1}+2}}{2^n-5\cdot 7^{n+2}}$ 6. $\lim\limits_{n\to\infty}\frac{\sqrt{1+5+5^2+\ldots+5^{2n}}+2^n}{6\cdot 3^{n+1}+7\cdot 5^{n+1}}$ 7. $\lim\limits_{n\to\infty} n^2\left(\sqrt{n(n^4+9)}-\sqrt{n^5-9}\right)$

8. $\lim\limits_{n\to\infty}\left(2n+\sqrt[3]{19-8n^3}\right)$ 9. $\lim\limits_{n\to\infty}\left[\frac{n+(n+1)+(n+2)+\ldots+5n}{n-2}-n\right]$ 10. $\lim\limits_{n\to\infty}\left(\frac{n^3+3\sqrt{n}}{n+2}-n^2\right)$

11. $\lim\limits_{n\to\infty}\left(\sin\sqrt[3]{3n^2-7}-\sin\sqrt[3]{3n^2}\right)\sin\frac{\pi n}{2}$ 12. $\lim\limits_{n\to\infty} arctg\frac{\sqrt[6]{3n^6-5}}{\sqrt[6]{4n^7+n}}\sin^5(n!)$ 13. $\lim\limits_{n\to\infty}\left(\frac{6-2n^3}{8-2n^3}\right)^{n^3+2}$

14. $\lim\limits_{n\to\infty}\left(\frac{\sqrt[3]{2n^3+3}}{\sqrt[3]{2n^3+3}+1}\right)^{2n}$ 15. $\lim\limits_{n\to\infty}\frac{\sqrt{n^2-n+4}-n}{3n-\sqrt{9n^2+n+1}}$

Вариант 28.

1. $\lim\limits_{n\to\infty}\frac{(n+5)^3(n-9)(6n+1)}{(4n^2-1)(5n-2)^3}$ 2. $\lim\limits_{n\to\infty}\frac{12n^2-5\sqrt{n+2}}{(\sqrt{6n}-1)^2(\sqrt{2n}-1)^2}$ 3. $\lim\limits_{n\to\infty}\frac{(\sqrt{2n+1}+\sqrt{3n+7})^2}{1-4n}$

4. $\lim\limits_{n\to\infty}\frac{(n-1)!-(n+1)!+(n+3)!}{(n+4)!}$ 5. $\lim\limits_{n\to\infty}\frac{3\cdot 7^{n+1}-4\cdot 5^{n+2}}{2\cdot 5^n+4\cdot 7^{n-1}}$ 6. $\lim\limits_{n\to\infty}\left(\frac{1}{n^2}+\frac{2}{n^2}+\frac{3}{n^2}+\ldots+\frac{n-1}{n^2}\right)$

7. $\lim\limits_{n\to\infty}\left(\sqrt{n}-\sqrt{n+\sqrt{n+3}}\right)$ 8. $\lim\limits_{n\to\infty}\left(\sqrt{9n^2+n+1}-3n\right)$ 9. $\lim\limits_{n\to\infty}\left(\frac{1+3+5+\ldots+(2n-1)}{n+2}-\frac{2n+1}{2}\right)$

10. $\lim\limits_{n\to\infty}\left(\frac{4n^2+n}{6n-1}+\frac{6n^3+1}{1-9n^2}\right)$ 11. $\lim\limits_{n\to\infty}\sin\frac{3n^2+1}{3n+2}\sin\frac{\sqrt{n+6}}{3n+5}$ 12. $\lim\limits_{n\to\infty}\left(\frac{n^3+2}{n^3-4}\right)^{n-n^3}$

13. $\lim\limits_{n\to\infty}(\sqrt{n^3+3}-\sqrt{n^3+2})\sin\frac{\pi n}{2}$ 14. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{n+3}+1}{\sqrt{n+3}+4}\right)^{\sqrt{n+5}}$ 15. $\lim\limits_{n\to\infty}\frac{\sqrt{n^2+4n+1}-\sqrt{n^2-4n-1}}{\sqrt[3]{1-n^3}+n}$

Вариант 29.

1. $\lim\limits_{n\to\infty}\frac{7n^9-n\cdot\sin 9n-99}{4n^9+n^6+(-1)^n}$ 2. $\lim\limits_{n\to\infty}\frac{(8+3\sqrt{n})^4(9n-5)}{2n^3+7n-319}$ 3. $\lim\limits_{n\to\infty}\frac{1+2+3+\ldots+3n}{\sqrt{n^4+8}+\sqrt[3]{2n^6-5}}$ 4. $\lim\limits_{n\to\infty}\frac{(n+2)!}{(n-3)^2 n!}$

5. $\lim\limits_{n\to\infty}\frac{14^{n-1}}{2\cdot 7^{2n+3}-6^{n+4}}$ 6. $\lim\limits_{n\to\infty}\frac{1+9^{-1}+9^{-2}+\ldots+9^{-n}}{1+11^{-1}+11^{-2}+\ldots+11^{-n}}$ 7. $\lim\limits_{n\to\infty}\sqrt[3]{n}\left(\sqrt[3]{n^2-6}-\sqrt[3]{n^2+6}\right)$

8. $\lim\limits_{n\to\infty} n\left(3n-\sqrt{9n^2+n}\right)$ 9. $\lim\limits_{n\to\infty}\left(n-\frac{n^2-2}{n+\sqrt{n}}\right)$ 10. $\lim\limits_{n\to\infty}\left(\frac{1-3n}{\sqrt{3n}+1}+\sqrt{3n}\right)$ 11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{n}-\cos\sqrt{n+10}\right)$

12. $\lim\limits_{n\to\infty}\left(\frac{n^2-3}{n^2+1}\right)^{2n-n^2}$ 13. $\lim\limits_{n\to\infty}\left[1-7(5n^2-1)^{-1/2}\right]^{6n}$ 14. $\lim\limits_{n\to\infty}\left(\frac{\sqrt{5n}+3}{\sqrt{5n}+5}\right)^{\sqrt{3n+4}}$ 15. $\lim\limits_{n\to\infty}\frac{\sqrt{2n+5}-\sqrt{2n-5}}{\sqrt{n^2+n-9}-\sqrt{n^2+n+9}}$

Вариант 30.

1. $\lim\limits_{n\to\infty}\frac{9n^{13}-2(-1)^n n^{12}-7}{5n^{13}-9n^7+1777}$ 2. $\lim\limits_{n\to\infty}\frac{(n-5)(n+9)(5-6n)^3}{(4n-1)(n-4)(1+8n)^3-2n^3}$ 3. $\lim\limits_{n\to\infty}\frac{\sqrt[6]{7n^4-n^2+7}-6n}{2\cdot\sqrt[7]{1-2n^7}-5n-5}$

4. $\lim\limits_{n\to\infty}\frac{(n+2)!-(n-1)!}{(n+1)!}$ 5. $\lim\limits_{n\to\infty}\frac{4\cdot 9^{n+2}-7\cdot 5^{n-1}}{3^{2n-1}+9\cdot 2^{n+3}}$ 6. $\lim\limits_{n\to\infty}\frac{1+8+8^2+\ldots+8^n}{1+10+10^2+\ldots+10^n}$ 7. $\lim\limits_{n\to\infty}(n+2)\left(7n-\sqrt{49n^2+n+3}\right)$

8. $\lim\limits_{n\to\infty}\sqrt[3]{n}\left(\sqrt[3]{(3n-1)^2}-\sqrt[3]{(3n+1)^2}\right)$ 9. $\lim\limits_{n\to\infty}\left(\frac{n^3+n^2}{n^2-3n+1}-\frac{n^2}{n+2}\right)$ 10. $\lim\limits_{n\to\infty}\left(\frac{1+2+3+\ldots+2n}{4n+1}-\frac{n}{3}\right)$

11. $\lim\limits_{n\to\infty}\left(\cos\sqrt{n^3}-\cos\sqrt{n^3+29}\right)$ 12. $\lim\limits_{n\to\infty}\left(\dfrac{2-3\sqrt{n}}{7-3\sqrt{n}}\right)^{5n-1}$ 13. $\lim\limits_{n\to\infty}\left(\dfrac{n-2n^2}{3-n-2n^2}\right)^{5n}$

14. $\lim\limits_{n\to\infty}\sin\left(\dfrac{\sqrt{n+3}}{5\sqrt{n}-n}\right)\cos(2n+n!)$ 15. $\lim\limits_{n\to\infty}\dfrac{3n-\sqrt{9n^2+1}}{\sqrt{n+6}-\sqrt{n+2}}$

2. РАСЧЕТНО-ГРАФИЧЕСКАЯ РАБОТА ПО ТЕМЕ

«ПРЕДЕЛ ФУНКЦИИ» (приложение 2).

Вариант 1.

1. $\lim\limits_{x\to2}\dfrac{x^3-8}{x^3-2x^2+x-2}$ 2. $\lim\limits_{x\to5}\dfrac{\sqrt{1+3x}-\sqrt{2x+6}}{x^2-5x}$ 3. $\lim\limits_{x\to1}\dfrac{\sqrt[6]{x}-1}{\sqrt{x}-1}$ 4. $\lim\limits_{x\to2}\left(\dfrac{1}{x^2-x-2}-\dfrac{2}{3x^2-6x}\right)$

5. $\lim\limits_{x\to0}\dfrac{\cos4x-\cos5x}{\sin x\sin7x}$ 6. $\lim\limits_{x\to0}\dfrac{tgx-\sin x}{x(1-\cos2x)}$ 7. $\lim\limits_{x\to\pi/4}\dfrac{1-\sin2x}{(\pi-4x)^2}$ 8. $\lim\limits_{x\to-4}\left(13+3x\right)^{x/(x^2-16)}$ 9. $\lim\limits_{x\to\pi/2}(1+2\cos x)^{3/\cos x}$

10. $\lim\limits_{x\to0}\left(\cos\pi x\right)^{1/x\sin\pi x}$ 11. $\lim\limits_{x\to0}(\sin5x-\sin4x)ctg9x$ 12. $\lim\limits_{x\to\pi/2}(x-\pi/2)tg3x$ 13. $\lim\limits_{x\to0}\dfrac{\ln(1+3x+5x^2)}{\sin(6x+3x^2)}$

14. $\lim\limits_{x\to1}\dfrac{\ln(4x-3)}{tg^2(5x-5)}$ 15. $\lim\limits_{x\to0}\dfrac{\arcsin(5x+x^2)+arctg^2\,5x}{x\sin7xtg4x^2}$

Вариант 2.

1. $\lim\limits_{x\to1}\dfrac{x^4-1}{2x^4-x^2-1}$ 2. $\lim\limits_{x\to-1}\dfrac{3x^2+4x+1}{\sqrt{x+3}-\sqrt{5+3x}}$ 3. $\lim\limits_{x\to1}\dfrac{\sqrt[4]{x}-1}{\sqrt{x}-1}$ 4. $\lim\limits_{x\to3}\left(\dfrac{1}{3-x}-\dfrac{6}{x^2-9}\right)$ 5. $\lim\limits_{x\to1}\dfrac{x^2-1}{\sin\pi x}$

6. $\lim\limits_{x\to0}\dfrac{\sqrt{x^2+6x+4}-2}{\sin5x+\sin3x}$ 7. $\lim\limits_{x\to\pi/2}\dfrac{tg7x}{tg5x}$ 8. $\lim\limits_{x\to0}(\cos4x)^{ctg^2\,6x}$ 9. $\lim\limits_{x\to3}\left(\dfrac{x}{3}\right)^{2/(x-3)}$ 10. $\lim\limits_{x\to2}\left(7-3x\right)^{1/(x-2)}$

11. $\lim\limits_{x\to0}(\cos9x-\cos3x)ctg^2\,4x$ 12. $\lim\limits_{x\to1}(1-x)tg(3\pi x/2)$ 13. $\lim\limits_{x\to0}\dfrac{e^{7x}-e^{4x}}{\sin8x-\sin5x}$ 14. $\lim\limits_{x\to\pi/2}\dfrac{2^{\cos x}-1}{\sin2x}$

15. $\lim\limits_{x\to0}\dfrac{\ln\left(1+\sin5x\right)}{\arcsin(4x+2x^2)}$

Вариант 3.

1. $\lim\limits_{x\to-1}\dfrac{x^3-3x-2}{\left(x^2-x-2\right)^2}$ 2. $\lim\limits_{x\to4}\dfrac{\sqrt{2x+1}-3}{\sqrt{x}-2}$ 3. $\lim\limits_{x\to1}\dfrac{x-1}{\sqrt[4]{x+15}-2}$ 4. $\lim\limits_{x\to2}\left(\dfrac{1}{2-x}-\dfrac{1}{x^2-5x+6}\right)$ 5. $\lim\limits_{x\to0}\dfrac{\cos x-\cos^3 x}{tg^2\,4x}$

6. $\lim\limits_{x\to0}\dfrac{\sqrt{1+3tg5x}-\sqrt{1-3tg5x}}{\sin5x+\sin7x}$ 7. $\lim\limits_{x\to\pi/4}\dfrac{1-tgx}{\cos2x}$ 8. $\lim\limits_{x\to0}(1-4x)^{3/\sin5x}$ 9. $\lim\limits_{x\to7}(2x-13)^{1/(7x^2-x^3)}$

10. $\lim\limits_{x\to1}\left(\dfrac{2x-1}{x}\right)^{ctg(1-x)}$ 11. $\lim\limits_{x\to\infty}x[tg(1/2x)+tg(1/6x)]$ 12. $\lim\limits_{x\to0}\left(\dfrac{1}{x\sin x}-\dfrac{ctgx}{x}\right)$ 13. $\lim\limits_{x\to0}\dfrac{\sqrt[6]{1+3x+6x^2}-1}{e^{\sin3x}-1+3tg2x}$

14. $\lim\limits_{x\to2}\dfrac{\ln(9-2x^2)}{\sin^2\pi x}$ 15. $\lim\limits_{x\to1}\dfrac{\cos(\pi x/2)}{\sqrt[5]{x}-1}$

Вариант 4.

1. $\lim\limits_{x\to-4}\dfrac{\sqrt{x+12}-\sqrt{4-x}}{x^2+2x-8}$ 2. $\lim\limits_{x\to-1}\dfrac{x^3+x+2}{x^3+x^2+x+1}$ 3. $\lim\limits_{x\to1}\dfrac{x^2-\sqrt{x}}{\sqrt{x^3}-1}$ 4. $\lim\limits_{x\to-2}\left(\dfrac{1}{x^2+5x+6}-\dfrac{1}{x+2}\right)$

5. $\lim\limits_{x\to 0}\dfrac{1-\cos x}{x(\sqrt{1+x}-1)}$ 6. $\lim\limits_{x\to 0}\dfrac{\sin 2x\sin 6x}{\sqrt{4+\sin 7x\sin 3x}-\sqrt{4-\sin 7x\sin 3x}}$ 7. $\lim\limits_{x\to -2}\dfrac{tg\pi x}{x^2-4}$ 8. $\lim\limits_{x\to 4}\left(\dfrac{\sin x}{\sin 4}\right)^{3/(x-4)}$

9. $\lim\limits_{x\to -2}(9+4x)^{3/(x^3+8)}$ 10. $\lim\limits_{x\to 0}(1+\sin x+\sin 5x)^{1/\sin 4x}$ 11. $\lim\limits_{x\to\infty}x[tg(1/2x)-tg(1/5x)]$

12. $\lim\limits_{x\to\pi/2}tg3xtg(x-\pi/2)$ 13. $\lim\limits_{x\to 0}\dfrac{\ln\cos 5x}{\ln\cos 7x}$ 14. $\lim\limits_{x\to 3}\dfrac{\sqrt[9]{x-2}-1}{\sqrt[5]{x-2}-1}$ 15. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{1+\sin 3x}-\sqrt[4]{1-tg4x}}{\arcsin(2x^2+3x)}$

Вариант 5.

1. $\lim\limits_{x\to -3}\dfrac{(x^2+2x-3)^2}{x^3+4x^2+3x}$ 2. $\lim\limits_{x\to 1}\dfrac{\sqrt{3+2x}-\sqrt{x+4}}{3x^2-4x+1}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt{x}-1}{\sqrt[3]{x}-1}$ 4. $\lim\limits_{x\to -2}\left(\dfrac{1}{x^2+x-2}-\dfrac{2}{3x^2+6x}\right)$

5. $\lim\limits_{x\to 0}\dfrac{2-\cos 4x-\cos 7x}{\sin x\sin 9x}$ 6. $\lim\limits_{x\to 0}\dfrac{3-\sqrt{9-x^2}}{1-\cos x}$ 7. $\lim\limits_{x\to\pi/2}\dfrac{1-\sin^3 x}{\cos^2 x}$ 8. $\lim\limits_{x\to 0}\left(\dfrac{3-2x}{3+2x}\right)^{2/\sin 3x}$

9. $\lim\limits_{x\to 0}(\cos x+\sin 3x)^{1/2x}$ 10. $\lim\limits_{x\to 0}(1+\cos 3x-\cos 2x)^{ctg^2 9x}$ 11. $\lim\limits_{x\to\infty}x^2[\cos(5/x)-\cos(8/x)]$ 12. $\lim\limits_{x\to 1}tg4\pi x\cdot ctg5\pi x$

13. $\lim\limits_{x\to 1}\dfrac{\sin(e^{x-1}-1)}{\ln x}$ 14. $\lim\limits_{x\to 0}\dfrac{(3^{\sin 5x}-1)tg3x}{\ln(1+\sin^2 6x)}$ 15. $\lim\limits_{x\to +0}\dfrac{\sqrt{x\cdot arctg4x}}{2x+\arcsin 5x}$

Вариант 6.

1. $\lim\limits_{x\to 0}\dfrac{(1-x)^3-1-3x}{x+x^5}$ 2. $\lim\limits_{x\to 3}\dfrac{x^2+x-12}{\sqrt{x-2}-\sqrt{4-x}}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt[3]{x}-1}{x-1}$ 4. $\lim\limits_{x\to -2}\left(\dfrac{1}{2+x}-\dfrac{3}{8+x^3}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{1-\cos^3 7x}{x\sin 4x}$

6. $\lim\limits_{x\to 0}\dfrac{tgxtg6x}{1-\sqrt{\cos 7x}}$ 7. $\lim\limits_{x\to 1}\dfrac{1+\cos\pi x}{tg^2\pi x}$ 8. $\lim\limits_{x\to 1}\left(\dfrac{3x-1}{x+1}\right)^{1/(\sqrt{x}-1)}$ 9. $\lim\limits_{x\to\infty}\left[\cos(1/x)+3\sin(1/x)\right]^x$ 10. $\lim\limits_{x\to 2}(3x-5)^{2x/(x^2-4)}$

11. $\lim\limits_{x\to 0}(1-\cos^2 6x)ctg^2 3x$ 12. $\lim\limits_{x\to 1}(1-\sqrt{x})tg(\pi x/2)$ 13. $\lim\limits_{x\to 0}\dfrac{\arcsin^2(3x)}{arctg(4x^2)-\sin 5x}$ 14. $\lim\limits_{x\to\infty}x\ln\sqrt{\dfrac{1+x}{x-1}}$

15. $\lim\limits_{x\to 0}\dfrac{7^x-5^x}{\sqrt{1+arctg4x}-1}$

Вариант 7.

1. $\lim\limits_{x\to -1/2}\dfrac{8x^3+1}{6x^2+5x+1}$ 2. $\lim\limits_{x\to 0}\dfrac{x^2+2x}{\sqrt[3]{x+1}-1}$ 3. $\lim\limits_{x\to 2}\dfrac{x-2}{2-\sqrt[4]{x+14}}$ 4. $\lim\limits_{x\to -2}\left(\dfrac{1}{x+2}-\dfrac{1}{x^2-4}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{\cos^3 5x-1}{1-\sqrt{\cos 4x}}$

6. $\lim\limits_{x\to 3}\dfrac{tg(x-3)}{x^2-9}$ 7. $\lim\limits_{x\to 1}\dfrac{\sin 3\pi x}{\sqrt{10-x}-3}$ 8. $\lim\limits_{x\to 0}\left(\dfrac{5+4x}{5-2x}\right)^{1/2x}$ 9. $\lim\limits_{x\to 0}(\cos\pi x)^{1/x\sin\pi x}$ 10. $\lim\limits_{x\to\pi/4}(tgx)^{tg2x}$

11. $\lim\limits_{x\to\pi/2}(x-\pi/2)tg5x$ 12. $\lim\limits_{x\to 1}(1-x^3)ctg2\pi x$ 13. $\lim\limits_{x\to 1}\dfrac{\sin(1-x)}{\sqrt[7]{x}-1}$

14. $\lim\limits_{x\to 1}\dfrac{tg(5^{x-1}-1)}{\ln x}$ 15. $\lim\limits_{x\to 0}\dfrac{\arcsin(2x+3x^2)-5x^2}{\sqrt{1-\sin(3x+2x^2)}-1}$

Вариант 8.

1. $\lim\limits_{x\to -1}\dfrac{x^4+3x+2}{x^6-1}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{1+x^2}-1}{\sqrt{x+1}-1}$ 3. $\lim\limits_{x\to 1}\dfrac{x^3-1}{\sqrt[3]{x}-1}$ 4. $\lim\limits_{x\to 1}\left(\dfrac{1}{1-x}-\dfrac{3}{1-x^3}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{\sqrt{1+tgx}-\sqrt{1+\sin x}}{\sqrt{\cos x}-1}$

6. $\lim\limits_{x\to 0}\dfrac{tg^3 7x}{x(\cos 3x-\cos x)}$ 7. $\lim\limits_{x\to\pi/6}\dfrac{1-2\sin x}{\cos 3x}$ 8. $\lim\limits_{x\to 4}\left(\dfrac{\cos 4}{\cos x}\right)^{2/(x-4)}$ 9. $\lim\limits_{x\to 0}(1-3x^2)^{1/(1-\cos 4x)}$

10. $\lim\limits_{x\to 6}(7-x)^{(1+x)/(x^2-5x-6)}$ 11. $\lim\limits_{x\to 1/2}\sin(1-2x)tg\pi x$ 12. $\lim\limits_{x\to \pi/4}(2x-\pi/2)ctg(x-\pi/4)$

13. $\lim\limits_{x\to +0}\dfrac{\ln(1+3x+4x^2)}{\sin\sqrt{2x}\cdot(2^{\sqrt{3x}}-1)}$ 14. $\lim\limits_{x\to\infty}x^2\ln\cos\dfrac{\pi}{x}$ 15. $\lim\limits_{x\to 0}\dfrac{\arcsin 3x+2arctg^2 5x}{x\sin 8x-3tg11x}$

Вариант 9.

1. $\lim\limits_{x\to -1}\dfrac{x^4+x^3+2x+2}{x^4-1}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{1+3x^2}-1}{x^3+x^2}$ 3. $\lim\limits_{x\to 3}\dfrac{\sqrt[4]{x-2}-1}{\sqrt{x-2}-1}$ 4. $\lim\limits_{x\to -3}\left(\dfrac{1}{x+3}-\dfrac{6}{x^2-9}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{\cos 4x}-1}{\cos x-\cos 5x}$

6. $\lim\limits_{x\to 0}\dfrac{\sqrt{x^2+4x+9}-3}{\sin 8x}$ 7. $\lim\limits_{x\to 0}\dfrac{\sin(2+x)-\sin(2-x)}{tg(2+x)-tg(2-x)}$ 8. $\lim\limits_{x\to 8}\left(\dfrac{\cos 8}{\cos x}\right)^{3/(8-x)}$ 9. $\lim\limits_{x\to -5}(6+x)^{(x+1)/(x^2-25)}$

10. $\lim\limits_{x\to 2}(\cos\pi x)^{ctg(x-2)}$ 11. $\lim\limits_{x\to \pi/8}tg4x\cdot ctg(\pi/4+2x)$ 12. $\lim\limits_{x\to\infty}x\sin(\pi/x)$ 13. $\lim\limits_{x\to 0}\dfrac{\ln\cos 6x}{\ln\cos 11x}$ 14. $\lim\limits_{x\to 1}\dfrac{e^x-e}{\sqrt{2-x}-1}$

15. $\lim\limits_{x\to 0}\dfrac{\sqrt{\cos 4x}-\sqrt{\cos 5x}}{x^2}$

Вариант 10.

1. $\lim\limits_{x\to 1}\dfrac{x^4-x^3+2x-2}{x^4-1}$ 2. $\lim\limits_{x\to 3}\dfrac{\sqrt{3x+7}-\sqrt{2x+10}}{\sqrt{4x+13}-\sqrt{x+22}}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt[6]{x}-1}{\sqrt[4]{x}-1}$ 4. $\lim\limits_{x\to -1}\left(\dfrac{1}{1+x}-\dfrac{3}{1+x^3}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{\sin 7x\sin 3x}{\sqrt{3x^2+4}-2}$

6. $\lim\limits_{x\to 0}\dfrac{\sin(3+4x)-\sin(3-4x)}{\sin 3x}$ 7. $\lim\limits_{x\to \pi/6}\dfrac{\cos(x-2\pi/3)}{\pi-6x}$ 8. $\lim\limits_{x\to +0}(1+tg^2(3\sqrt{x}))^{3/5x}$ 9. $\lim\limits_{x\to 1}(3x-2)^{5x/(x^2-1)}$

10. $\lim\limits_{x\to -3}\left(\dfrac{9+2x}{3}\right)^{tg(\pi x/6)}$ 11. $\lim\limits_{x\to 1}(1-\sqrt[3]{x})tg(\pi x/2)$ 12. $\lim\limits_{x\to +\infty}3^x\sin(2/3^x)$ 13. $\lim\limits_{x\to 0}\dfrac{\sin 6x-\sin 5x}{e^{7x}-e^x}$

14. $\lim\limits_{x\to 1}\dfrac{\sqrt[3]{1+\ln^2 x}-1}{1+\cos\pi x}$ 15. $\lim\limits_{x\to 0}\dfrac{\sqrt[5]{1+arctg4x}-1}{3x+\arcsin x^2}$

Вариант 11.

1. $\lim\limits_{x\to 0}\dfrac{x+\sqrt[5]{x}}{2-\sqrt[3]{8-x}}$ 2. $\lim\limits_{x\to -1}\dfrac{x^3+4x^2+3x}{x^2+3x+2}$ 3. $\lim\limits_{x\to -1}\dfrac{x^2-1}{\sqrt[3]{x}+1}$ 4. $\lim\limits_{x\to 2}\left(\dfrac{1}{x^2-x-2}-\dfrac{2}{3x^2-6x}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{1-\cos 7x}{\cos^3 3x-1}$

6. $\lim\limits_{x\to \pi/2}\dfrac{tg\cos x}{\cos x}$ 7. $\lim\limits_{x\to \pi}\dfrac{\cos 3x-\cos x}{tg^2 2x}$ 8. $\lim\limits_{x\to +0}(\cos(\sqrt{3x}))^{4/x}$ 9. $\lim\limits_{x\to 2}(3x-5)^{1/(x^2-2x)}$

10. $\lim\limits_{x\to 0}\left(\dfrac{cosx}{\cos 2x}\right)^{1/x\sin 8x}$ 11. $\lim\limits_{x\to \pi}(\sin x-\sin 4x)ctg2x$

12. $\lim\limits_{x\to \pi/2}\left(\dfrac{1}{\cos x}-tgx\right)$ 13. $\lim\limits_{x\to 0}\dfrac{\sqrt{1+\sin 3x}-1}{\ln(1+tg4x)+x^2}$ 14. $\lim\limits_{x\to 1}\dfrac{\ln x}{\arcsin(2^{x-1}-1)}$ 15. $\lim\limits_{x\to\infty}(25x-13)\ln\dfrac{3x-11}{3x+14}$

Вариант 12.

1. $\lim\limits_{x\to 1}\dfrac{x^6-1}{2x^4-x^2-1}$ 2. $\lim\limits_{x\to 1}\dfrac{\sqrt[3]{1-2x}+1}{x+\sqrt[3]{x-2}}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt{x}-1}{\sqrt[3]{x^2}-1}$ 4. $\lim\limits_{x\to -1}\left(\dfrac{2}{1-x^2}-\dfrac{3}{1+x^3}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{\sin 9x\sin 6x}{1-\cos^3 8x}$

6. $\lim\limits_{x\to 0}\dfrac{x^3}{tgx-\sin x}$ 7. $\lim\limits_{x\to \pi}\dfrac{tg5x}{tg3x}$ 8. $\lim\limits_{x\to 9}\left(\dfrac{\sin 9}{\sin x}\right)^{4/(9-x)}$ 9. $\lim\limits_{x\to 4}(2x-7)^{1/(x^2-3x-4)}$ 10. $\lim\limits_{x\to 3}(2-x/3)^{ctg(\pi x/3)}$

11. $\lim\limits_{x\to 7}\sin[(x-7)/2]tg(\pi x/14)$ 12. $\lim\limits_{x\to\infty}x^2[1-\cos(2/x)]$ 13. $\lim\limits_{x\to 0}\dfrac{\sin 4x+tg(x^2+x)}{\ln(1+5x-2x^2)}$ 14. $\lim\limits_{x\to \pi/6}\dfrac{\ln\sin 3x}{(6x-\pi)^2}$

15. $\lim\limits_{x\to 0}\dfrac{\sin^2(\sin 4x)\cdot tg^4 2x}{arctg^6 9x}$

Вариант 13.

1. $\lim\limits_{x\to -1}\dfrac{x^3+2x+3}{x^4-1}$ 2. $\lim\limits_{x\to 8}\dfrac{\sqrt[3]{x}-2}{\sqrt{9+2x}-5}$ 3. $\lim\limits_{x\to 2}\dfrac{\sqrt[3]{x-1}-1}{\sqrt[6]{x-1}-1}$ 4. $\lim\limits_{x\to 1}\left(\dfrac{2}{1-x^2}-\dfrac{4}{1-x^4}\right)$ 5. $\lim\limits_{x\to 0}\dfrac{\sin^3(5x)}{\sin(x^3)}$

6. $\lim\limits_{x\to 0}\dfrac{\cos x-\cos^3 x}{1-\sqrt{1-x^2}}$ 7. $\lim\limits_{x\to 0}\dfrac{tgx-\sin x}{x\sin^2 x}$ 8. $\lim\limits_{x\to 0}(1-3x)^{2/\sin 8x}$ 9. $\lim\limits_{x\to\infty}\left[\cos(3/x)\right]^x$ 10. $\lim\limits_{x\to -2}(3x+7)^{2/(x^2-4)}$

11. $\lim\limits_{x\to 1}(1-\sqrt[3]{x})tg(\pi x/2)$ 12. $\lim\limits_{x\to+\infty}2^x tg(3/2^x)$ 13. $\lim\limits_{x\to 0}\dfrac{\arcsin 4x+2x^2}{arctg(2x+x^2)}$ 14. $\lim\limits_{x\to 0}\dfrac{\ln^2(1+tg6x)}{\sin 5x\cdot(3^{tg9x}-1)}$

15. $\lim\limits_{x\to 2}\dfrac{\ln(3x-5)}{e^{x^2-4}-1}$

Вариант 14.

1. $\lim\limits_{x\to 5}\dfrac{4x^2-17x-15}{9x^2-52x+35}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt{2x+9}-3}{\sqrt{2x^2+x+4}-2}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt[3]{x^2}-1}{\sqrt[6]{x}-1}$ 4. $\lim\limits_{x\to -3}\left(\dfrac{1}{x+3}-\dfrac{6}{x^2-9}\right)$

5. $\lim\limits_{x\to 0}\dfrac{\sin(5+x)-\sin(5-x)}{tg(5+x)-tg(5-x)}$ 6. $\lim\limits_{x\to 0}\dfrac{\sin 2x^2}{1-\sqrt[3]{\cos 5x}}$ 7. $\lim\limits_{x\to\pi/2}\dfrac{\sin 4x}{\sin 6x}$ 8. $\lim\limits_{x\to 0}\left(\dfrac{4+3x}{4-3x}\right)^{1/\sin 7x}$ 9. $\lim\limits_{x\to 0}(\cos x)^{1/3\sin x}$

10. $\lim\limits_{x\to 2}(9-4x)^{1/(x^2-4)}$ 11. $\lim\limits_{x\to\infty}x^2[\cos(1/5x)-\cos(1/7x)]$ 12. $\lim\limits_{x\to 1/2}(1+\cos 2\pi x)ctg^2 6\pi x$ 13. $\lim\limits_{x\to 0}\dfrac{3x+arctg5x^2}{4x-\arcsin 3x^2}$

14. $\lim\limits_{x\to\pi/4}\dfrac{\ln tgx}{\cos 2x}$ 15. $\lim\limits_{x\to 0}\dfrac{2^{\sin 2x}-2^{\sin 7x}}{\ln(1-2\arcsin 2x)}$

Вариант 15.

1. $\lim\limits_{x\to 3}\dfrac{x^4-18x^2+81}{x^4-81}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt{1+3x}-\sqrt{1+5x^2}}{\sqrt{1-7x}-1}$ 3. $\lim\limits_{x\to 1}\dfrac{x^2-\sqrt{x}}{1-\sqrt{x}}$ 4. $\lim\limits_{x\to -1}\left(\dfrac{3}{1+x^3}-\dfrac{4}{1-x^4}\right)$ 5. $\lim\limits_{x\to 3}\dfrac{\cos x-\cos 3}{\sin x-\sin 3}$

6. $\lim\limits_{x\to 0}\dfrac{\sin 8xtg3x}{\sqrt{3x^2+2}-\sqrt{2}}$ 7. $\lim\limits_{x\to\pi/6}\dfrac{2\sin x-1}{6x-\pi}$ 8. $\lim\limits_{x\to 0}\left(\dfrac{3+4x}{3-x}\right)^{4/7x}$ 9. $\lim\limits_{x\to 0}(\cos x+\sin 4x)^{2/x}$

10. $\lim\limits_{x\to 1}(7-6x)^{tg(\pi x/2)}$ 11. $\lim\limits_{x\to 5}\sin\left(\dfrac{x-5}{2}\right)tg\left(\dfrac{\pi x}{10}\right)$ 12. $\lim\limits_{x\to\infty}x^2(1-\cos(5/x))$ 13. $\lim\limits_{x\to 0}\dfrac{x\ln(1+tg8x)}{\sqrt{1-\sin 3x^2}-1}$

14. $\lim\limits_{x\to-\infty}\dfrac{\ln(1+2^x)}{\ln(1+3^x)}$ 15. $\lim\limits_{x\to 0}\dfrac{arctg3x+\ln(1+3x^2)}{\sqrt[3]{tg4x\cdot\sin^2 7x}}$

Вариант 16.

1. $\lim\limits_{x\to 1}\dfrac{x^3+4x-5}{2x^2+5x-7}$ 2. $\lim\limits_{x\to -8}\dfrac{\sqrt{1-x}-3}{2+\sqrt[3]{x}}$ 3. $\lim\limits_{x\to\sqrt{e}}\dfrac{2\ln^2 x+\ln x-1}{2\ln^2 x-3\ln x+1}$ 4. $\lim\limits_{x\to-\infty}(x+\sqrt[3]{3-x^3})$ 5. $\lim\limits_{x\to 0}\dfrac{tgx-tg5x}{\sin 8xtg9x}$

6. $\lim\limits_{x\to 0}\dfrac{\sin 2xtg13x}{\sqrt[3]{5x^2-1}+1}$ 7. $\lim\limits_{x\to\pi/8}\dfrac{tg2x-1}{\pi-8x}$ 8. $\lim\limits_{x\to 9}\left(\dfrac{\cos x}{\cos 9}\right)^{3/(9-x)}$ 9. $\lim\limits_{x\to 3}(x/3)^{5/(x-3)}$ 10. $\lim\limits_{x\to 0}(1-\sin 2x+\sin 9x)^{1/\sin 3x}$

11. $\lim\limits_{x\to\infty}x[tg(1/x)-tg(3/x)]$ 12. $\lim\limits_{x\to 0}(\sqrt{2x^2-x+4}-2)\cdot ctg\pi x$

13. $\lim\limits_{x\to 0}\dfrac{\sin 5x+arctg6x}{\sqrt{1+7x+tgx^2}-1}$ 14. $\lim\limits_{x\to 1}\dfrac{tg(2^{x-1}-1)}{\ln x}$ 15. $\lim\limits_{x\to 0}\dfrac{\sqrt{\cos 6x}-\sqrt{\cos x}}{x^2}$

Вариант 17.

1. $\lim\limits_{x\to 1}\dfrac{x^4-1}{3x^2-5x+2}$ 2. $\lim\limits_{x\to 5}\dfrac{5x^2-26x+5}{\sqrt{2x}-\sqrt{x+5}}$ 3. $\lim\limits_{x\to 3\pi/4}\dfrac{1+ctg^3x}{2+ctgx+ctg^3x}$ 4. $\lim\limits_{x\to-\infty}(\sqrt{(x+3)(x+5)}+x)$

5. $\lim\limits_{x\to 0}\dfrac{1+x\sin x-\cos 2x}{\sin^2 6x}$ 6. $\lim\limits_{x\to 0}\dfrac{\sqrt{2+5\sin 3x}-\sqrt{2-5\sin 3x}}{tg4x}$ 7. $\lim\limits_{x\to\pi}\dfrac{\sin 5x}{\sin 8x}$ 8. $\lim\limits_{x\to 0}(\cos(3x))^{2/\sin 2x}$

9. $\lim\limits_{x\to 0}(1-6x^2)^{1/(1-\cos 7x)}$ 10. $\lim\limits_{x\to+0}\left(\dfrac{2+4x}{2-3x}\right)^{1/\sqrt{x}}$ 11. $\lim\limits_{x\to 3}\sin\left(\dfrac{x-3}{2}\right)tg\left(\dfrac{\pi x}{6}\right)$ 12. $\lim\limits_{x\to 1}(1-x)\mathrm{tg}\left(\dfrac{\pi x}{2}\right)$

13. $\lim\limits_{x\to+0}x(6^{\sin\frac{5}{3x}}-1)$ 14. $\lim\limits_{x\to 7}\dfrac{\sqrt[5]{x^2-14x+50}-1}{\ln(x-6)}$ 15. $\lim\limits_{x\to-\infty}\dfrac{\ln(1+6^x)}{\ln(1+7^x)}$

Вариант 18.

1. $\lim\limits_{x\to 1}\dfrac{x^3+5x-6}{x^4-1}$ 2. $\lim\limits_{x\to-1}\dfrac{\sqrt{6x^2+3}+3x}{x^2-1}$ 3. $\lim\limits_{x\to\pi/4}\dfrac{ctg^2x-3ctgx+2}{ctg^2x-4ctgx+3}$ 4. $\lim\limits_{x\to-\infty}(x+\sqrt{x^2+3x+7})$

5. $\lim\limits_{x\to 0}\dfrac{\sin(6+4x)-\sin(6-4x)}{\sin 5x}$ 6. $\lim\limits_{x\to 0}\dfrac{tg7x}{7-\sqrt{5x^2+2x+49}}$ 7. $\lim\limits_{x\to\pi/2}\dfrac{\cos x}{(1-\sin x)^{2/3}}$

8. $\lim\limits_{x\to 0}(\cos 3x)^{ctg^2 4x}$ 9. $\lim\limits_{x\to+0}\left(\dfrac{2+\sqrt{x}}{2+2\sqrt{x}}\right)^{1/x}$ 10. $\lim\limits_{x\to 0}(1+\cos 3x-\cos x)^{1/\sin^2 7x}$ 11. $\lim\limits_{x\to 4}tg((x-4)/2)\cdot tg(\pi x/8)$

12. $\lim\limits_{x\to\infty}x^2[1-\cos^3(3/x)]$ 13. $\lim\limits_{x\to+0}\dfrac{2x+arctg\sqrt{x}}{\ln(1+5\sqrt{x})}$ 14. $\lim\limits_{x\to 0}\dfrac{x}{5^x-7^x}$ 15. $\lim\limits_{x\to+\infty}x\big(\ln(x+3)-\ln(x-3)\big)$

Вариант 19.

1. $\lim\limits_{x\to-1}\dfrac{x^4+x^3+2x+2}{x^2+3x+2}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt{1+3x}-\sqrt{1-2x}}{2x+3x^3}$ 3. $\lim\limits_{x\to-\pi/2}\dfrac{\sin^2 x+2\sin x+1}{2\sin^2 x-\sin x-3}$ 4. $\lim\limits_{x\to-\infty}x(\sqrt{x^2+7x+3}+x)$

5. $\lim\limits_{x\to\pi/4}\dfrac{ctgx-1}{\sqrt[3]{\cos 2x}}$ 6. $\lim\limits_{x\to 0}\dfrac{tg3x\sin 9x}{\sqrt{2-\sin^2 4x}-\sqrt{2+\sin^2 4x}}$ 7. $\lim\limits_{x\to\pi}\dfrac{tg7x}{tg5x}$ 8. $\lim\limits_{x\to 0}(1-\sin 6x)^{ctg5x}$

9. $\lim\limits_{x\to+0}\left(\dfrac{4+\sqrt{x}}{4-2\sqrt{x}}\right)^{1/x\sqrt{x+2}}$ 10. $\lim\limits_{x\to 0}(\cos x/\cos 2x)^{ctg^2 8x}$ 11. $\lim\limits_{x\to\infty}x^2[\cos(6/x)-\cos(3/x)]$ 12. $\lim\limits_{x\to 1}(2-\sqrt{5-x})ctg3\pi x$

13. $\lim\limits_{x\to 0}\dfrac{\sin x^3-2arctgx^2}{\arcsin 4x\cdot\sin(5x/2)}$ 14. $\lim\limits_{x\to 2}\dfrac{x-2}{5^x-25}$ 15. $\lim\limits_{x\to 0}\dfrac{\sqrt[6]{1+2tg^2 5x}-1}{x\cdot arctg(2x)+4x^3}$

Вариант 20.

1. $\lim\limits_{x\to 7}\dfrac{2x^2-11x-21}{x^3-343}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{1+2x}-\sqrt[3]{1-2x}}{3x+4x^2}$ 3. $\lim\limits_{x\to e}\dfrac{\ln^4 x-1}{2\ln^2 x-\ln x-1}$ 4. $\lim\limits_{x\to-\infty}(\sqrt[3]{2x^3+4}+\sqrt[3]{3-2x^3})$

5. $\lim\limits_{x\to 0}\dfrac{\sin^3(3x/2)}{\sin(7x^3)}$ 6. $\lim\limits_{x\to 0}\dfrac{\sqrt{3+4tg6x}-\sqrt{3-4tg6x}}{\sin 9x}$ 7. $\lim\limits_{x\to\pi/4}\dfrac{\sqrt{\sin 2x}-1}{\cos 2x}$ 8. $\lim\limits_{x\to 0}\left(\dfrac{3-x}{3+x}\right)^{4ctg5x}$

9. $\lim\limits_{x\to 0}\left(\dfrac{2+3x}{2+5x}\right)^{1/(2x^2-4x)}$ 10. $\lim\limits_{x\to 0}(1+\sin 3x+\sin 6x)^{1/\sin 4x}$ 11. $\lim\limits_{x\to\infty}x\big[tg(1/x)+tg(1/5x)\big]$

12. $\lim\limits_{x\to\pi/2}(2x\cdot tgx-\pi/\cos x)$ 13. $\lim\limits_{x\to0}\dfrac{arctg^2 3x-4x^3}{\arcsin(8x+3x^2)}$ 14. $\lim\limits_{x\to3}\dfrac{e^{3x}-e^9}{\arcsin(x-3)}$ 15. $\lim\limits_{x\to0}\dfrac{2-2^x-3^x}{7^x-5^x}$

Вариант 21.

1. $\lim\limits_{x\to1/3}\dfrac{3x^2+2x-1}{3x^2+5x-2}$ 2. $\lim\limits_{x\to-1}\dfrac{x^3+1}{\sqrt{9+4x+4x^2}-3}$ 3. $\lim\limits_{x\to\pi/4}\dfrac{6tg^2x-5tgx-1}{7tg^2x-10tgx+3}$ 4. $\lim\limits_{x\to-\infty}(\sqrt{9x^2-2x-3}+3x)$

5. $\lim\limits_{x\to0}\dfrac{\sin3x\sin11x}{\cos5x+\cos8x-2}$ 6. $\lim\limits_{x\to0}\dfrac{tg^2 8x}{1-\sqrt[3]{\cos14x}}$ 7. $\lim\limits_{x\to1}\dfrac{1+\cos\pi x}{tg^2\pi x}$ 8. $\lim\limits_{x\to0}\left(\dfrac{3-\sqrt{x}}{3+2\sqrt{x}}\right)^{1/\sqrt{2x^2+5x}}$

9. $\lim\limits_{x\to0}(\cos x+\sin4x)^{1/x}$ 10. $\lim\limits_{x\to4}(\cos2x/\cos8)^{1/(x-4)}$ 11. $\lim\limits_{x\to0}(\cos^4 3x-1)ctg^2 6x$ 12. $\lim\limits_{x\to+\infty}2^x\cdot tg(7/2^x)$

13. $\lim\limits_{x\to0}\dfrac{x\cdot\arcsin3x}{\ln(1-tg^2 9x)}$ 14. $\lim\limits_{x\to3}\dfrac{\ln(2x-5)}{e^{\sin\pi x}-1}$ 15. $\lim\limits_{x\to0}\dfrac{\sin^2 3x+2^{tg\,2x}-1}{\ln(1+\arcsin3x^2)}$

Вариант 22.

1. $\lim\limits_{x\to-1/2}\dfrac{8x^3+1}{2x^2+11x+5}$ 2. $\lim\limits_{x\to-1}\dfrac{\sqrt[3]{1+2x}+1}{\sqrt[3]{2+x}+x}$ 3. $\lim\limits_{x\to1/e}\dfrac{6\ln^2 x+5\ln x-1}{\ln^4 x-1}$ 4. $\lim\limits_{x\to-\infty}x(\sqrt{4x^2+7}+2x)$ 5. $\lim\limits_{x\to0}\dfrac{\sin6xtg7x}{\sqrt{\cos5x}-1}$

6. $\lim\limits_{x\to\pi/6}\dfrac{\sqrt{3}\sin x-\cos x}{36x^2-\pi^2}$ 7. $\lim\limits_{x\to0}\dfrac{\sqrt{1+x\cdot\sin x}-\sqrt{\cos2x}}{tg(x/2)tg8x}$ 8. $\lim\limits_{x\to6}\left(\dfrac{\sin6}{\sin x}\right)^{3/(x-6)}$ 9. $\lim\limits_{x\to0}(2-\cos7x)^{4/x^2}$

10. $\lim\limits_{x\to1}\left(\dfrac{1+2x}{4-x}\right)^{\frac{1}{1-x^2}}$ 11. $\lim\limits_{x\to0}(\cos3x-\cos x)ctg(\pi x/2)$

12. $\lim\limits_{x\to1}ctg(5\pi x)\cdot tg(7\pi x)$ 13. $\lim\limits_{x\to0}\dfrac{\sin^2 4x+x^3}{e^{x^2}-1}$ 14. $\lim\limits_{x\to1}\dfrac{x^2-1}{4^x+2^x-6}$ 15. $\lim\limits_{x\to+0}\dfrac{\arcsin3x+6x^2}{\sqrt[4]{tg4x\cdot\sin^3 5x}}$

Вариант 23.

1. $\lim\limits_{x\to1}\dfrac{x^3+2x^2-x-2}{(2x^2-x-1)^2}$ 2. $\lim\limits_{x\to-2}\dfrac{\sqrt[3]{x-6}+2}{\sqrt{x+4}-\sqrt{2}}$ 3. $\lim\limits_{x\to\pi/6}\dfrac{-3+10\sin x-8\sin^2 x}{3-11\sin x+10\sin^2 x}$ 4. $\lim\limits_{x\to-\infty}(x+\sqrt[3]{x-x^3})$

5. $\lim\limits_{x\to0}\dfrac{1-\cos2x}{\cos7x-\cos3x}$ 6. $\lim\limits_{x\to0}\dfrac{tg2x\cdot tg8x}{1-\sqrt{\cos9x}}$ 7. $\lim\limits_{x\to\pi/3}\dfrac{\sin(x-\pi/3)}{1-8\cos^3 x}$ 8. $\lim\limits_{x\to0}\left(\dfrac{2+5x}{2-x}\right)^{4/\sin3x}$ 9. $\lim\limits_{x\to1}(5-4x)^{(x^2+1)/(x^2-1)}$

10. $\lim\limits_{x\to0}(1-\cos3x+\cos6x)^{ctg^2 8x}$ 11. $\lim\limits_{x\to+\infty}(x+2)[\ln(x+3)-\ln x]$ 12. $\lim\limits_{x\to1}(3-\sqrt{10-x})\cdot ctg^2\pi x$

13. $\lim\limits_{x\to0}\dfrac{arctg7x+\ln(1-2\sin x^2)}{\sqrt{1+6x+5x^2}-1}$ 14. $\lim\limits_{x\to1}\dfrac{\sin(\pi x)}{\ln(\ln x+1)}$ 15. $\lim\limits_{x\to0}\dfrac{arctg3x^2-2tg^3 2x}{\ln(1+5\arcsin^2 4x)}$

Вариант 24.

1. $\lim\limits_{x\to-1}\dfrac{x^3-x}{x^4-1}$ 2. $\lim\limits_{x\to3}\dfrac{\sqrt{x+1}-2}{\sqrt[3]{5+x}-2}$ 3. $\lim\limits_{x\to e}\dfrac{\ln^2 x+\ln x-2}{\ln^3 x-1}$ 4. $\lim\limits_{x\to-\infty}(\sqrt{x^2+4x+1}+x)$ 5. $\lim\limits_{x\to\pi/2}\dfrac{\cos x}{\pi-2x}$

6. $\lim\limits_{x\to0}\dfrac{\sqrt{2+5\sin4x}-\sqrt{2-5\sin4x}}{8x+3x^2}$ 7. $\lim\limits_{x\to0}\dfrac{\sqrt[4]{1+x\sin x}-1}{x\sin(x/2)}$ 8. $\lim\limits_{x\to+0}(\cos(\sqrt{13x}))^{4/x}$ 9. $\lim\limits_{x\to1}(2-x)^{2x/(1-x)}$

10. $\lim\limits_{x\to0}\left(\dfrac{1+tgx}{1+\sin x}\right)^{1/\sin^3 x}$ 11. $\lim\limits_{x\to\pi/4}\cos2x\cdot tg(x+\pi/4)$ 12. $\lim\limits_{x\to\infty}x\ln\dfrac{2x+1}{2x+3}$ 13. $\lim\limits_{x\to\infty}x(5^{3/x}-1)$

14. $\lim\limits_{x\to0}\dfrac{e^{x^2}-1}{\sin^2 4x-3\mathrm{tg}^2x^2}$ 15. $\lim\limits_{x\to0}\dfrac{\sqrt[7]{1-2arctg4x}-1}{\sqrt{1+3\arcsin2x}-1}$

Вариант 25.

1. $\lim\limits_{x\to 1}\dfrac{x^6-1}{2x^2+5x-7}$ 2. $\lim\limits_{x\to 2}\dfrac{\sqrt{1+5x}-\sqrt{5+3x}}{x^2-11x+18}$ 3. $\lim\limits_{x\to \pi/4}\dfrac{2tg^3x-2tg^2x+tgx-1}{tg^3x-1}$ 4. $\lim\limits_{x\to -\infty}(3x+\sqrt{9x^2+2x+3})$

5. $\lim\limits_{x\to 0}\dfrac{tg(3+4x)-tg(3-4x)}{\sin 5x}$ 6. $\lim\limits_{x\to 0}\dfrac{tg8x-tg3x}{4-\sqrt{2x^2+5x+16}}$ 7. $\lim\limits_{x\to 1}\dfrac{tg(\pi x)}{\sin(\pi x)}$ 8. $\lim\limits_{x\to 0}(\cos 3x)^{ctg^2 9x}$ 9. $\lim\limits_{x\to 1}(3-2x)^{x/(1-x)}$

10. $\lim\limits_{x\to 0}(1+tg9x-tg8x)^{1/\sin 6x}$ 11. $\lim\limits_{x\to 0}(2-\sqrt{2x^2+3x+4})ctg3x$ 12. $\lim\limits_{x\to 1}tg(3\pi x)ctg(5\pi x)$

13. $\lim\limits_{x\to +0}\dfrac{\sin(2\sqrt[4]{x})+2\sqrt{x}}{\ln(1+3\sqrt[4]{x})-5\sqrt[3]{x}}$ 14. $\lim\limits_{x\to 2}\dfrac{2^{x^2-4}-1}{tg\ln(x/2)}$ 15. $\lim\limits_{x\to 0}\dfrac{\ln(1-3x)+e^{tg7x}-1}{2^{\sin 5x}-1}$

Вариант 26.

1. $\lim\limits_{x\to 1}\dfrac{x^3+4x-5}{x^2+5x-6}$ 2. $\lim\limits_{x\to 3}\dfrac{\sqrt[3]{9x}-3}{\sqrt{3+x}-\sqrt{2x}}$ 3. $\lim\limits_{x\to -\pi/2}\dfrac{\sin^2 x-5\sin x-6}{\sin^3 x+1}$ 4. $\lim\limits_{x\to -\infty}x(\sqrt{4x^2+2x}+2x)$

5. $\lim\limits_{x\to 0}\dfrac{tgx-tg3x}{\sin 4x\sin 9x}$ 6. $\lim\limits_{x\to 7}\dfrac{\sin\sqrt{x}-\sin\sqrt{7}}{2x-14}$ 7. $\lim\limits_{x\to \pi}\dfrac{\cos 3x-\cos x}{tg^2 2x}$ 8. $\lim\limits_{x\to 0}\left(\dfrac{2-2x^2}{2+x+3x^2}\right)^{1/4x}$ 9. $\lim\limits_{x\to 0}(\sqrt{1+x}-x)^{1/x}$

10. $\lim\limits_{x\to 0}(\cos 5x)^{1/(x\sin 9x)}$ 11. $\lim\limits_{x\to 0}(1-\sqrt{\cos 9x})\cdot ctg2x\cdot ctg5x$ 12. $\lim\limits_{x\to \pi/4}\cos 2x\cdot tg(x+\pi/4)$

13. $\lim\limits_{x\to 0}\dfrac{arctgx^3+tg^2 5x^2}{\arcsin^2 4x\cdot\sin(3x/7)}$ 14. $\lim\limits_{x\to 1}\dfrac{\ln^2 x}{1+\cos\pi x}$ 15. $\lim\limits_{x\to 0}\dfrac{e^x-e^{-x}}{tg^2x-\sin x}$

Вариант 27.

1. $\lim\limits_{x\to -1}\dfrac{x^4+5x+4}{x^4-1}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{8+5x-x^2}-2}{\sqrt[3]{2x^2+x^3}}$ 3. $\lim\limits_{x\to \pi/3}\dfrac{4\cos^2 x-1}{2\cos^2 x+\cos x-1}$ 4. $\lim\limits_{x\to -\infty}x(\sqrt[3]{x^3+3}+\sqrt[3]{2-x^3})$

5. $\lim\limits_{x\to 0}\dfrac{\cos(2+2x)-\cos(2+x)}{x^2}$ 6. $\lim\limits_{x\to 0}\dfrac{\sqrt{2+3tg4x}-\sqrt{2-3tg7x}}{\sin 13x}$ 7. $\lim\limits_{x\to \pi/6}\dfrac{\sin(\pi/6-x)}{1-2\sin x}$ 8. $\lim\limits_{x\to 0}(1-3x)^{4ctg8x}$

9. $\lim\limits_{x\to \infty}\left(\cos(4/x)\right)^x$ 10. $\lim\limits_{x\to 0}(\sqrt{1-x}-x)^{1/3x}$ 11. $\lim\limits_{x\to 0}(tgx+tg6x)\sqrt{ctgx\cdot ctg7x}$ 12. $\lim\limits_{x\to \pi}(1+\cos 3x)ctg^2 5x$

13. $\lim\limits_{x\to 0}\dfrac{x\cdot arctg(3x-7x^2)}{\arcsin^2(9x+2x^2)+2tg^3x}$ 14. $\lim\limits_{x\to 0}\dfrac{\ln(1+tg4x^2)}{3^{\arcsin 9x}-1}$ 15. $\lim\limits_{x\to 0}\dfrac{\ln(2-\cos x)}{(e^{\sin 5x}-1)^2}$

Вариант 28.

1. $\lim\limits_{x\to 1}\dfrac{x^4+x^3-2}{x^2-8x+7}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt{3-4x}-\sqrt{3+4x}}{\sqrt{1+2x}-1}$ 3. $\lim\limits_{x\to -\pi/4}\dfrac{4tg^3x+4tg^2x-3tgx-3}{tg^3x+tgx+2}$ 4. $\lim\limits_{x\to -\infty}x(\sqrt{4x^2-5x-1}+2x)$

5. $\lim\limits_{x\to 0}\dfrac{tg7xtg9x}{\cos 8x-\cos 3x}$ 6. $\lim\limits_{x\to 0}\dfrac{x\cdot\sin 5x}{1-\sqrt[3]{\cos 4x}}$ 7. $\lim\limits_{x\to \pi/4}\dfrac{1-\sqrt{2}\sin x}{\sqrt{2}\cos x-1}$ 8. $\lim\limits_{x\to +0}[1-tg^2(3\sqrt{x})]^{3/x}$ 9. $\lim\limits_{x\to +0}\left(\dfrac{5+\sqrt{x}}{5+2\sqrt{x}}\right)^{1/\sqrt{2x+x^2}}$

10. $\lim\limits_{x\to 1/3}(\sin 6x/\sin 2)^{1/(x-1/3)}$ 11. $\lim\limits_{x\to -5}tg\dfrac{x+5}{3}tg\dfrac{\pi x}{10}$ 12. $\lim\limits_{x\to +\infty}2^x\cdot tg(3\cdot 2^{-x})$ 13. $\lim\limits_{x\to 0}\dfrac{x^2\cdot\arcsin 5x}{arctg^3 6x+2x^4}$

14. $\lim\limits_{x\to 0}\dfrac{3^{\sin 4x}-1}{\ln(1+arctg6x)}$ 15. $\lim\limits_{x\to 1/2}\dfrac{\ln(4x-1)}{\sqrt{1-\cos\pi x}-1}$

Вариант 29.

1. $\lim\limits_{x\to 1/2}\dfrac{8x^3-1}{16x^2-10x+1}$ 2. $\lim\limits_{x\to 4}\dfrac{\sqrt{x^2+9}-5}{3-\sqrt{1+2x}}$ 3. $\lim\limits_{x\to e}\dfrac{\ln^3 x+2\ln x-3}{\ln^4 x-1}$ 4. $\lim\limits_{x\to-\infty} x(\sqrt{9x^2+x}+3x)$

5. $\lim\limits_{x\to 0}\dfrac{tg(3+4x)-tg(3-4x)}{\sin(5+2x)-\sin(5-2x)}$ 6. $\lim\limits_{x\to 0}\dfrac{\sin 2x+\sin 5x}{\sqrt{3x+5}-\sqrt{5}}$ 7. $\lim\limits_{x\to-\pi/4}\dfrac{\sqrt{2}-2\cos x}{\pi+4x}$ 8. $\lim\limits_{x\to 0}(cos6x)^{ctg2x/\sin 7x}$

9. $\lim\limits_{x\to 0}\left(\dfrac{3+5\sin 7x}{3-\sin 7x}\right)^{1/8x}$ 10. $\lim\limits_{x\to-1}(3+2x)^{x/(x^2-1)}$ 11. $\lim\limits_{x\to 0}\sqrt{\cos 5x-\cos 9x}\cdot ctg2x$ 12. $\lim\limits_{x\to-2}\sin\dfrac{x+2}{3}\cdot tg\dfrac{\pi x}{4}$

13. $\lim\limits_{x\to\pi/2}\dfrac{\sin^2 x-1}{arctg(2x-\pi)}$ 14. $\lim\limits_{x\to 0}\dfrac{\ln(\cos 5x)}{\ln(\cos 6x)}$ 15. $\lim\limits_{x\to 0}\dfrac{\sin 5x+\sqrt[6]{1-x^7}-1}{\sqrt[4]{tg4x\cdot\sin^3 6x}}$

Вариант 30.

1. $\lim\limits_{x\to-1}\dfrac{2x^3+5x^2+5x+2}{5+4x-x^2}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{1-2x+x^3}-1}{2-\sqrt[3]{8-x}}$ 3. $\lim\limits_{x\to\pi/6}\dfrac{8\sin^3 x-1}{2\sin^2 x+\sin x-1}$ 4. $\lim\limits_{x\to-\infty}(3x+\sqrt[3]{6-27x^3})$

5. $\lim\limits_{x\to 0}\dfrac{\cos 6x-\cos x}{1-\cos^3 7x}$ 6. $\lim\limits_{x\to 0}\dfrac{tg5x\cdot\sin 2x}{1-\sqrt{\cos 9x}}$ 7. $\lim\limits_{x\to\pi/2}\dfrac{\cos x-\sin x+1}{\cos x+\sin x-1}$ 8. $\lim\limits_{x\to 1}\left(\dfrac{1+3x}{5-x}\right)^{\frac{1}{x^2+x-2}}$ 9. $\lim\limits_{x\to 0}\left(\cos\dfrac{\pi}{4}x\right)^{ctg3x}$

10. $\lim\limits_{x\to+0}\left(\dfrac{6-\sqrt{3x}}{6+\sqrt{2x}}\right)^{1/\sqrt{4x+2x^2}}$ 11. $\lim\limits_{x\to+0}\sqrt{5x-7x^2}\cdot ctg(\sqrt{6x})$ 12. $\lim\limits_{x\to-\pi/4}\cos 2x\cdot tg(x-\pi/4)$

13. $\lim\limits_{x\to+0}\dfrac{tg9x\cdot\arcsin^2\sqrt{3x}}{\sqrt{1+\sin 5x^2}-1}$ 14. $\lim\limits_{x\to 2\pi}\dfrac{\ln\cos x}{e^{\sin 2x}-1}$ 15. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{1+x^2}-1-\sin 3x}{\ln(1+x)+e^{tg^2 4x}-1}$

3. РАСЧЕТНО-ГРАФИЧЕСКАЯ РАБОТА НА ТЕМУ «НЕПРЕРЫВНОСТЬ ФУНКЦИЙ».

Исследовать на непрерывность функции (приложение 3).

Вариант 1.

1. $f(x)=\dfrac{\sin 3x}{2x}+\dfrac{x-1}{x^2-4}$ 2. $f(x)=(1+2x)^{2/x}+\dfrac{1}{x^3+2x^2+2x+1}, f(0)=7$

3. $f(x)=0, x<-\pi;\sin x, -\pi<x<0;\pi, x\ge 0$ 4. $f(x)=\operatorname{arctg}\dfrac{2}{x-3}$ 5. $f(x)=2^{x/(1-x)}$

Вариант 2.

1. $f(x)=\dfrac{\sqrt{1+x}-1}{x}+\dfrac{x+3}{x^2-16}$ 2. $f(x)=(1+5x)^{3/x}+\dfrac{x+6}{x^3-8}, f(0)=0$

3. $f(x)=\dfrac{|x+5|}{x+5}-\dfrac{5}{x}$ 4. $f(x)=\dfrac{2^{1/x}+3^{1/x}}{2^{1/x}-3^{1/x}}$ 5. $f(x)=e^{2x+1/x}$

Вариант 3.

1. $f(x)=\dfrac{\sin(x-2)}{x^2-4}+\dfrac{1}{x^2+x}$ 2. $f(x)=\left(\dfrac{\cos x}{\cos 1}\right)^{1/(x-1)}-\dfrac{x^2+2x}{x^2-4}, f(1)=-2$

3. $f(x)=x+1, x<0;(x+1)^2, 0<x\le 2;\ 4-x,\ x>2$ 4. $f(x)=\dfrac{1}{1+3^{1/(x-2)}}$ 5. $f(x)=x^2e^{-1/x}$

Вариант 4.

1. $f(x)=\frac{\sqrt[3]{1+x}-1}{x}+\frac{x+3}{x^2+x-6}$ 2. $f(x)=\frac{\sin 7x}{x}+\frac{x+5}{x^3-x^2-x+1}, f(0)=-1$ 3. $f(x)=\frac{|x+4|}{x+4}-\frac{4}{x}$

4. $f(x)=\operatorname{arcctg}\frac{1}{x-6}$ 5. $f(x)=\frac{1}{1-2^{\frac{1}{x-3}}}$

Вариант 5.

1. $f(x)=\frac{\operatorname{arctg}3x}{x}+\frac{x+4}{x^3-8}$ 2. $f(x)=(1-3x)^{4/x}+\frac{1}{x^4-625}, f(0)=1$

3. $f(x)=-x, x<0; x^3, 0\le x<2; 3, x>2$ 4. $f(x)=\frac{2}{1-2^{2x/(1-x)}}$ 5. $f(x)=\frac{1}{x\cdot 5^{1/x}}$

Вариант 6.

1. $f(x)=\frac{\sqrt{4-2x}-2}{x}-\frac{x+3}{x^4-1}$ 2. $f(x)=\left(\frac{\sin x}{\sin 1}\right)^{\frac{1}{x-1}}+\frac{x}{x^2-4}, f(1)=1$

3. $f(x)=\frac{|x+3|}{x+3}-x^2$ 4. $f(x)=\operatorname{arcctg}\frac{6}{(x-1)^3}$ 5. $f(x)=x^2\cdot 2^{-1/(3-x)}$

Вариант 7.

1. $f(x)=\frac{\operatorname{arctg}7x}{x}+\frac{2x-1}{x^2-25}$ 2. $f(x)=\frac{\sin 5x}{\sqrt{x+2}-\sqrt{2}}+\frac{x+3}{x^2+2x+1}, f(0)=-1$

3. $f(x)=-2, x<-\pi/2; 2\sin x, -\pi/2\le x<\pi/2; 1, x\ge\pi/2$ 4. $f(x)=\frac{3^{1/(x-2)}-2}{3^{1/(x-2)}+2}$ 5. $f(x)=\frac{1}{1-7^{\frac{1}{x}}}$

Вариант 8.

1. $f(x)=\frac{\sqrt[3]{1-x-x^2}-1}{x}+\frac{2x+3}{x^3-125}$ 2. $f(x)=\frac{\sin 3x}{x^2-2x}+\frac{1}{x+2}, f(0)=-1$

3. $f(x)=\frac{|x^2+5x|}{x+5}-x$ 4. $f(x)=\operatorname{arcctg}\frac{1}{3-x}$ 5. $f(x)=e^{x/(4-x^2)}$

Вариант 9.

1. $f(x)=\frac{1-\cos 7x}{x^2}+\frac{1}{2x^2-3x+1}$ 2. $f(x)=(1-2\sin 5x)^{3/x}+\frac{x+5}{x^2+2x+1}, f(0)=-2$

3. $f(x)=\frac{|x+2|}{x+2}, x<-2; \sqrt{4-x^2}, -2\le x\le 2; \frac{1}{x-2}x>2$ 4. $f(x)=\frac{1}{1+5^{\frac{1}{x}}}$ 5. $f(x)=2^{x-\frac{1}{x}}$

Вариант 10.

1. $f(x)=\frac{\sqrt{1+x+2x^2}-1}{x}+\frac{x+3}{x^2-1}$ 2. $f(x)=\frac{\sin^3 2x}{3x^3}+\frac{x+1}{x^4-16}, f(0)=5$

3. $f(x)=x+\frac{x+2}{|x+2|}$ 4. $f(x)=\frac{3}{1+2^{(x^2-1)/(x^2-4)}}$ 5. $f(x)=|x+1|e^{-1/x}$

Вариант 11.

1. $f(x)=\frac{\sin x-\sin 7x}{x}+\frac{x+3}{x^2-25}$ 2. $f(x)=(\cos 8x)^{3/x^2}+\frac{1}{x^3-1}, f(0)=0$

3. $f(x)=\dfrac{2|x-1|}{x^2-x^3}$ 4. $f(x)=\operatorname{arctg}\dfrac{1}{7^{1/x}}$ 5. $f(x)=\ln(1+2^{3/(x+2)})$

Вариант 12.

1. $f(x)=(x/3)^{2/(x-3)}-(x-1)^{-6}$ 2. $f(x)=\dfrac{\sin(3x^2-2x)}{x}+\dfrac{1}{x-3}, f(0)=1$

3. $f(x)=\dfrac{|x|}{x}, x<0; \sqrt{1-x^2}, 0\le x\le 1; 1/(x-1), x>1$ 4. $f(x)=arctg(2^{1/x})$ 5. $f(x)=\dfrac{1}{x^2\cdot 6^{1/x}}$

Вариант 13.

1. $f(x)=\dfrac{\cos 7x-\cos 2x}{x^2}-\dfrac{x}{x^4-1}$ 2. $f(x)=(1+3x)^{1/x}+(x^2-1)^{-2}, f(0)=1$

3. $f(x)=\dfrac{|x+1|}{x+1}x^2+x$ 4. $f(x)=\operatorname{arcctg}(5^{2/(x-3)})$ 5. $f(x)=2^{x/(9-x^2)}$

Вариант 14.

1. $f(x)=(2-\cos 8x)^{2/x^2}+(x-5)^{-8}$ 2. $f(x)=\dfrac{1-\cos^3 3x}{x^2}-\dfrac{1}{(x-4)^3}, f(0)=-2$

3. $f(x)=\dfrac{|x+3|}{x+3}, x<-3; \sqrt{9-x^2}, -3\le x\le 3; \dfrac{1}{x-3}x>3$

4. $f(x)=\dfrac{1}{1-7^{1/(x+1)}}$ 5. $f(x)=2^{2x/(3x-1)}$

Вариант 15.

1. $f(x)=\dfrac{\sin x-\sin 1}{x-1}+\dfrac{1}{2x^2-3x}$ 2. $f(x)=\left(\dfrac{\cos x}{\cos 3}\right)^{1/(x-3)}+\dfrac{x}{x^2-1}, f(3)=-2$

3. $f(x)=-\dfrac{|x|}{x}, x<0; \sqrt{4-x^2}, 0\le x\le 2; \dfrac{1}{x-2}x>2$

4. $f(x)=\operatorname{arcctg}(1/3^{1/x})$ 5. $f(x)=|x|e^{-1/x}$

Вариант 16.

1. $f(x)=(2-\cos 5x)^{2/x^2}+\dfrac{x-3}{x^2-9}$ 2. $f(x)=\dfrac{\operatorname{arctg}7x}{x}+\dfrac{x}{(x-2)^2}, f(0)=5$

3. $f(x)=1-x^3, x<0; (x-1)^3, 0\le x\le 2; 4-x, x>2$

4. $f(x)=\operatorname{arcctg}\dfrac{3}{x-4}$ 5. $f(x)=\dfrac{x}{3^{1/x}}$

Вариант 17.

1. $f(x)=\dfrac{\cos x-\cos 2}{x-2}+\dfrac{3}{x^2}$ 2. $f(x)=\dfrac{\sin^3 4x}{x^3}-\dfrac{x}{x-1}, f(0)=0$

3. $f(x)=\dfrac{|x^2-4|}{x-2}-x$ 4. $f(x)=\dfrac{5^{1/x}+2^{1/x}}{5^{1/x}-2^{1/x}}$ 5. $f(x)=\arcsin[1/(x-4)]$

Вариант 18.

1. $f(x)=\dfrac{\sin(x+2)}{x^2-4}+\dfrac{1}{(x+1)^2}$ 2. $f(x)=(1-\sin 7x)^{1/x}+\dfrac{2x}{x+2}, f(0)=-2$

3. $f(x)=2^x,\ -1\le x<1;\ 1,\ x=1;\ x-1,\ 1<x\le 4$ 4. $f(x)=\dfrac{1}{1-5^{\frac{1}{3-x}}}$ 5. $f(x)=x^2e^{-\frac{1}{x-6}}$

Вариант 19.

1. $f(x)=x\sin(2/x)+1/(x-1)^6$ 2. $f(x)=\dfrac{\operatorname{arctg}3x}{x}+\dfrac{1}{(x-2)^2}, f(0)=-1$

3. $f(x)=\dfrac{|x+4|}{x^2-16}-x$ 4. $f(x)=\operatorname{arcctg}\dfrac{1}{x+5}$ 5. $f(x)=\sin\left(5^{\frac{1}{4-x}}\right)$

Вариант 20.

1. $f(x)=\left(\dfrac{\sin x}{\sin 3}\right)^{\frac{2}{x-3}}+\dfrac{4}{x^3-8}$ 2. $f(x)=\dfrac{\sin 3x}{\sqrt{x+4}-2}-\dfrac{1}{(x-1)^3}, f(0)=1$

3. $f(x)=\cos(\pi x/2), |x|\le 1;\ |x-1|, |x|>1$ 4. $f(x)=\dfrac{2}{1-7^{\frac{x}{3-x}}}$ 5. $f(x)=\dfrac{1}{x\cdot 3^{\frac{1}{x+1}}}$

Вариант 21.

1. $f(x)=\dfrac{\sin(3-x)}{x^3-27}-\dfrac{1}{x^4-1}$ 2. $f(x)=\left(\dfrac{2x+1}{3x+1}\right)^{1/x}+(x-1)^{-8}, f(0)=1$

3. $f(x)=\dfrac{|x+4|}{x^2-16}-x^2$ 4. $f(x)=\operatorname{arcctg}\dfrac{2}{(x-3)^3}$ 5. $f(x)=x^2\cdot 7^{-\frac{1}{4-x}}$

Вариант 22.

1. $f(x)=\dfrac{arctg4x}{x}+\dfrac{x-1}{x^3-125}$ 2. $f(x)=\dfrac{\operatorname{arctg}3x}{\sqrt{x+3}-\sqrt{3}}+\dfrac{x+3}{x^2+4x+4}, f(0)=-1$

3. $f(x)=2\sqrt{x}, 0\le x\le 1, 4-2x, 1<x<2.5, 2x-7, x\ge 2.5$ 4. $f(x)=\dfrac{5^{\frac{1}{x-3}}-1}{5^{\frac{1}{x-3}}+1}$ 5. $f(x)=\operatorname{arctg}\dfrac{1}{x-1}$

Вариант 23.

1. $f(x)=\dfrac{\sqrt[3]{1+2x+x^2}-1}{x}+\dfrac{x+3}{x^3-8}$ 2. $f(x)=\dfrac{\operatorname{arctg}2x}{x^2+3x}+\dfrac{x}{x-1}, f(0)=1$

3. $f(x)=\dfrac{|x^2-6x|}{x-6}-3x$ 4. $f(x)=\operatorname{arcctg}\dfrac{1}{4-2x}$ 5. $f(x)=6^{\frac{x}{9-x^2}}$

Вариант 24.

1. $f(x)=\dfrac{\operatorname{arctg}(x-1)}{x^2-1}+\dfrac{1}{(x+2)^4}$ 2. $f(x)=(1-\sin 9x)^{5/x}+\dfrac{1}{x^2-2x+1}, f(0)=-4$

3. $f(x)=1-x^2, x\le 0;\ x, 0<x<1;\ 1, x\ge 1$ 4. $f(x)=\dfrac{1}{1+7^{\frac{2}{x-3}}}$ 5. $f(x)=3^{2x-\frac{3}{x}}$

Вариант 25.

1. $f(x)=(\cos 7x)^{\frac{1}{x^2}}+\dfrac{x+2}{(x^2-1)^2}$ 2. $f(x)=\dfrac{\sin^4 x}{3x^4}+\dfrac{x}{x^4-16}, f(0)=5$

3. $f(x)=x^2+\dfrac{2x+4}{|x+2|}$ 4. $f(x)=\dfrac{3}{1+3^{\frac{x^2-1}{x^2-9}}}$ 5. $f(x)=|x-2|e^{-\frac{1}{x+2}}$

Вариант 26.

1. $f(x)=\dfrac{\cos x-\cos 5}{x^2-25}+\dfrac{1}{x^3}$ 2. $f(x)=\dfrac{e^x-e^{3x}}{x}-\dfrac{3x}{x-1}, f(0)=0$

3. $f(x)=\dfrac{|2x-4|}{x^3-8}+x+1$ 4. $f(x)=\operatorname{arctg}\dfrac{1}{2^{\frac{1}{x+4}}}$ 5. $f(x)=\ln\left(1+5^{\frac{6}{x+4}}\right)$

Вариант 27.

1. $f(x)=\left(\dfrac{x}{7}\right)^{\frac{2}{x-7}}-(x-2)^{-8}$ 2. $f(x)=\dfrac{\sin(x^2-5x)}{x}+\dfrac{1}{x-6}, f(0)=1$

3. $f(x)=\dfrac{|x^3|}{x}, x<0; \sqrt{1-x^2}, 0\le x\le 1; \sqrt{x}, x>1$ 4. $f(x)=\operatorname{arctg}\left(3^{\frac{1}{x+3}}\right)$ 5. $f(x)=\dfrac{1}{x^2\cdot 7^{1/x}}$

Вариант 28.

1. $f(x)=\dfrac{\cos 9x-\cos 2x}{x^2}-\dfrac{1}{x^6-1}$ 2. $f(x)=\left(\dfrac{1+4x}{1+3x}\right)^{\frac{1}{x}}+(x^3-1)^{-2}, f(0)=1$

3. $f(x)=\dfrac{|x+2|}{x+2}x^2+3x$ 4. $f(x)=\operatorname{arcctg}\left(2^{\frac{4}{5-x}}\right)$ 5. $f(x)=3^{\frac{x}{25-x^2}}$

Вариант 29.

1. $f(x)=(2-\cos 6x)^{\frac{9}{x^2}}+(x+1)^{-9}$ 2. $f(x)=\dfrac{\sin x\sin 7x}{x^2}-\dfrac{1}{(x+6)^3}, f(0)=-2$

3. $f(x)=0.5x^2, |x|<2;\ 2.5, |x|=2;\ 3, |x|>2$ 4. $f(x)=\dfrac{1}{1-5^{\frac{1}{2-x}}}$ 5. $f(x)=9^{\frac{x}{4x-2}}$

Вариант 30.

1. $f(x)=\dfrac{\sin x-\sin 9}{x-9}+\dfrac{x}{2x^2-1}$ 2. $f(x)=\left(\dfrac{\cos x}{\cos 9}\right)^{\frac{1}{x-9}}+\dfrac{x}{x^4-1}, f(9)=0$

3. $f(x)=\dfrac{|x^3-1|}{x^2-1}+x+1$ 4. $f(x)=\operatorname{arcctg}\left(2^{-\frac{1}{2-x}}\right)$ 5. $f(x)=|x|\cdot 5^{-\frac{1}{x}}$

4. Дополнительные варианты

4.1. Предел последовательности (приложение 4)

Вариант 1.

1. $\lim\limits_{n\to\infty}\dfrac{3n^2+8n+1}{(5n+2)(2n+1)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3-n)^2+(n+3)^2}{(3-n)^2-(n+3)^2}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{3n+1}}{(3n+2)(2n+3)}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n+3}}{\sqrt{3n+2}+\sqrt{2n+1}}$

5. $\lim\limits_{n\to\infty}\dfrac{2^{n+1}-5^{n-1}}{3^{n+2}+5^n}$

Вариант 2.

1. $\lim\limits_{n\to\infty}\dfrac{(2n+1)^3+n^2}{(n+1)^2+4n^2}$ 2. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n+5}\left(3n^2+1\right)}{1-2n+3n^2}$ 3. $\lim\limits_{n\to\infty}\dfrac{(3-n)^3-(2-n)^3}{(1-n)^3-(1+n)^3}$

4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n^2+1}+3n}{2n+3}$ 5. $\lim\limits_{n\to\infty}\dfrac{2^{n-1}+3^{n+2}}{2^{n+1}-3^n}$

Вариант 3.

1. $\lim\limits_{n\to\infty}\dfrac{2n^3+3n^2+n}{\left(2n^2+1\right)(3n+2)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(6-n)^2-(6+n)^2}{(6+n)^2-(1-n)^2}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{3n^6+4}\left(3n-1\right)}{3n^2+6n+1}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{3n+1}}{\sqrt[3]{4n+1}+\sqrt[3]{n}}$

5. $\lim\limits_{n\to\infty}\dfrac{5^{2n-1}-2^{2n}}{2^{2n+1}+5^{2n+2}}$

Вариант 4.

1. $\lim\limits_{n\to\infty}\dfrac{\left(3n+2\right)\left(4n+1\right)}{7n^2+2n+99}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3-n)^3-(2+n)^3}{(1-n)^3-(1+n)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{n^2+2n+3}{\left(2n+1\right)\sqrt[3]{n^4+2}}$

4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+2}+\sqrt{3n+1}}{\sqrt{5n+8}}$ 5. $\lim\limits_{n\to\infty}\dfrac{3^{n-1}+2^{n+2}}{2^{n-1}+3^{n+3}}$

Вариант 5.

1. $\lim\limits_{n\to\infty}\dfrac{6n^3-3n^2+1}{\left(3n+5\right)\left(4n^2+2\right)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2-n)^3-(2+n)^3}{(1+n)^3-(1-n)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{\left(2n+8\right)\sqrt{4n+1}}{2n^2+3n+1}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{2n+3}}{\sqrt[3]{n+2}+\sqrt[3]{3n+5}}$ 5. $\lim\limits_{n\to\infty}\dfrac{5^{n+2}-7^{n-1}}{5^n+7^{n+1}}$

Вариант 6.

1. $\lim\limits_{n\to\infty}\dfrac{(5n^2+1)(6n+2)}{5n^3+2n^2-n+6}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+1)^3-(n+1)^2}{(n-1)^3-(n+1)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{3n^3+5n+1}{(2n^2+3)\sqrt{n^3+6}}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n+3}}{\sqrt{3n+4}+\sqrt{4n+2}}$ 5. $\lim\limits_{n\to\infty}\dfrac{7^{n+1}-3^{n+2}}{2^{n-1}+7^{n+1}}$

Вариант 7.

1. $\lim\limits_{n\to\infty}\dfrac{3n^4+2n^3+1}{\left(2n^2+3\right)\left(5n^2+1\right)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n+1)^3-8n^3}{(2n+1)^2+4n^2}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{4n+2}+\sqrt[3]{2n+3}}{\sqrt[3]{5n+8}}$ 4. $\lim\limits_{n\to\infty}\dfrac{(3n^2+10)\sqrt[5]{2n+1}}{5n^2-2n+1}$ 5. $\lim\limits_{n\to\infty}\dfrac{3^{n+1}+5^{n+1}}{3^{n-1}-5^{n-2}}$

Вариант 8.

1. $\lim\limits_{n\to\infty}\dfrac{\left(2n+5\right)\left(3n^2+8\right)}{6n^3+2n+3}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3-4n)^2}{(n-3)^3-(n+3)^3}$ 3. $\lim\limits_{n\to\infty}\dfrac{5n^2-2n+3}{\sqrt{4n+3}\left(3n+1\right)}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{2n+5}}{\sqrt[4]{5n+6}+\sqrt[4]{3n+2}}$

5. $\lim\limits_{n\to\infty}\dfrac{7^{n-1}+3^{n+2}}{2^n+7^{n+1}}$

Вариант 9.

1. $\lim\limits_{n\to\infty}\dfrac{6n^5+2n-3n^2}{\left(3n^3+2\right)\left(3n^2+5\right)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3-n)^3}{(n+1)^2-(n+1)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{3n^3+8n+5}{(2n+1)\sqrt{2n^3+4}}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+2}+\sqrt{2n+5}}{\sqrt{5n+8}}$ 5. $\lim\limits_{n\to\infty}\dfrac{4^{n+1}-3^{n-1}}{4^{n-1}+3^{n+2}}$

Вариант 10.

1. $\lim\limits_{n\to\infty}\dfrac{2n^4+3n-5}{(3n+2)\left(7n^3-1\right)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+1)^3-(n+2)^3}{(4-n)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5n^2+2}\left(n^2+3\right)}{3n^2+n+5}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{2n+3}+\sqrt[3]{n}}{\sqrt[3]{3n+5}}$ 5. $\lim\limits_{n\to\infty}\dfrac{4^{n+4}-2^{n-1}}{2^{n+1}-4^{n+2}}$

Вариант 11.

1. $\lim\limits_{n\to\infty}\dfrac{\left(5n^2+2\right)(n+2)}{1-4n-3n^3}$ 2. $\lim\limits_{n\to\infty}\dfrac{n^2\sqrt{2n+3}}{(99n+1)(n+3)}$

3. $\lim\limits_{n\to\infty}\dfrac{(n+1)^3-(n-2)^3}{n^2+2n-3}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[5]{2n+5}}{\sqrt[5]{7n+1}+\sqrt[5]{6n+3}}$ 5. $\lim\limits_{n\to\infty}\dfrac{2^{2n+1}-3^{2n}}{3^{2n-2}+2^{2n+3}}$

Вариант 12.

1. $\lim\limits_{n\to\infty}\dfrac{2n^3-4n+3}{(3n-2)\left(5-n^2\right)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+1)^3-(n+2)^3}{3n^2+2n+3}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n-2}+\sqrt{6n+1}}{\sqrt{8+3n}}$ 4. $\lim\limits_{n\to\infty}\dfrac{100n^2+32n+1}{\sqrt{2n+1}(2n+5)}$ 5. $\lim\limits_{n\to\infty}\dfrac{3^{n+2}+5^{n-1}}{2^{n-1}+5^{n+1}}$

Вариант 13.

1. $\lim\limits_{n\to\infty}\dfrac{4n^3+7n^2-1}{(2n+3)(4n+2)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2-n)^2+(2+n)^2}{(3-n)^2-(3+n)^2}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{3n+1}}{(4n+2)(2n+1)}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+7}}{\sqrt{5n+3}+\sqrt{4n+1}}$ 5. $\lim\limits_{n\to\infty}\dfrac{4^{n+2}-5^{n-1}}{3^{n+3}+5^n}$

Вариант 14.

1. $\lim\limits_{n\to\infty}\dfrac{(1+2n)^3+3n^2-2}{4n^3+n+1}$ 2. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+2}\left(2n^2+5\right)}{4-2n^2+3n^4}$

3. $\lim\limits_{n\to\infty}\dfrac{(1+n)^3-(2-n)^3}{(1-n)^3-(1+n)^3}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n^2+1}+3n^2}{2n+7}$ 5. $\lim\limits_{n\to\infty}\dfrac{2^{n+3}+7^{n+2}}{2^{n+1}-7^{n-1}}$

Вариант 15.

1. $\lim\limits_{n\to\infty}\dfrac{5n^3+3n-7}{\left(2n^3+1\right)(5n+8)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3-n)^2+(3+n)^2}{(6+n)^2-(1-n)^2}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{3n+8}(3n-1)}{5n^2-6n+15}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[5]{5n+6}}{\sqrt[5]{2n+3}+\sqrt[5]{3n+1}}$ 5. $\lim\limits_{n\to\infty}\dfrac{4^{2n+1}+2^{2n}}{2^{2n+3}-5^{2n}}$

Вариант 16.

1. $\lim\limits_{n\to\infty}\dfrac{(5n+8)(1-2n)}{5n^2-3n+2}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3-n)^3-(2-n)^3}{(1-n)^3-(1+n)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{n^2+2n+3}{(2n+5)\sqrt[3]{n^4+3}}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5n+6}+2\sqrt{3n+2}}{\sqrt{7n-3}}$ 5. $\lim\limits_{n\to\infty}\dfrac{3^{n-1}+4^{n+5}}{3^{n+1}+4^{n-1}}$

Вариант 17.

1. $\lim\limits_{n\to\infty}\dfrac{(5n^2+1)(6n+4)}{3n^3+2n+5}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n-3)^3-(n+5)^3}{(3n-1)^3+(2n+3)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{4n^3-7n^2+2}{(5n^2+7)\sqrt{n^3+16}}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{5n-3}}{\sqrt[4]{3n+2}+\sqrt[4]{6n+3}}$ 5. $\lim\limits_{n\to\infty}\dfrac{8^{n+2}-2^{n+3}}{2^{n-1}+8^{n+1}}$

Вариант 18.

1. $\lim\limits_{n\to\infty}\dfrac{5n^2+3-17n^4}{(3n^2+5)(2n^2+1)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(1+3n)^3-27n^3}{1+3n^2+2n}$

3. $\lim\limits_{n\to\infty}\dfrac{(5n^2+10)\sqrt[3]{n+8}}{6n^2+17n-1}$ 4. $\lim\limits_{n\to\infty}\dfrac{2\sqrt{6n+1}+\sqrt{8n+3}}{\sqrt{3n+1}}$ 5. $\lim\limits_{n\to\infty}\dfrac{2^{n+3}+6^{n-1}}{2^{n-1}-6^{n+2}}$

Вариант 19.

1. $\lim\limits_{n\to\infty}\dfrac{(3n+6)(5n^2-8)}{8-2n-n^3}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2-3n)^2}{(n-2)^3-(n+3)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{6n^2+5n-6}{\sqrt{2n+3}(6+2n)}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{3n+5}}{2\sqrt[4]{3n+7})+\sqrt[4]{6n+3}}$ 5. $\lim\limits_{n\to\infty}\dfrac{7^{n+3}+3^{n+2}}{3^{n-1}-7^{n+5}}$

Вариант 20.

1. $\lim\limits_{n\to\infty}\dfrac{4n^5-2n^3+3n+1}{(4n^3+1)(5-2n^2)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(3-n)^3}{(n+1)^3-(n-1)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{5n^3-2n+3}{(3n^2+1)\sqrt{2n+3})}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{5n+8}+4\sqrt[3]{2n+6}}{\sqrt[3]{3n+2}}$ 5. $\lim\limits_{n\to\infty}\dfrac{4^{n+3}-3^{n+5}}{4^{n-1}+3^{n+2}}$

Вариант 21.

1. $\lim\limits_{n\to\infty}\dfrac{5n^4+6n-3}{(3n+2)(6n^3-1)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+4)^3-(n+2)^3}{(4-n)^3}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5n^2+1}(n^2+4)}{6n^2-3n+5}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{3n+4}+\sqrt[3]{2n}}{\sqrt[3]{2n+1}}$ 5. $\lim\limits_{n\to\infty}\dfrac{5^{n+3}-4^{n-1}}{4^{n+1}-5^{n+2}}$

Вариант 22.

1. $\lim\limits_{n\to\infty}\dfrac{(3n^2+2)(n+3)}{1-5n-7n^3}$ 2. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n+3}\cdot n}{(51n+3)(2n+3)}$

3. $\lim\limits_{n\to\infty}\dfrac{(n+1)^3-(n-2)^3}{3n^2+5n+2}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{7n+4}}{3\sqrt{5n+1}+\sqrt{n+2}}$ 5. $\lim\limits_{n\to\infty}\dfrac{5^{2n+1}-3^{2n}}{3^{2n+1}+5^{2n}}$

Вариант 23.

1. $\lim\limits_{n\to\infty}\dfrac{3n^3-4n^2+2}{(5n+2)(6n^2+3)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+2)^3-(n+1)^3}{5n^2+3n+2}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5n+3}+\sqrt{7n+3}}{\sqrt{n}+5}$ 4. $\lim\limits_{n\to\infty}\dfrac{16n-3n^2-50n^3}{\sqrt{2n^2+3}(99n+5)}$ 5. $\lim\limits_{n\to\infty}\dfrac{4^{n+2}+3^{n-1}}{3^{n-2}+4^{n+1}}$

Вариант 24.

1. $\lim\limits_{n\to\infty}\dfrac{2n^2-5n^3+1}{(n+8)(4-n^2)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(2n+1)^3-(2n+3)^3}{(2n+1)^2+n^2}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{3n+2}(n+8)}{1-3n-n^2}$ 4. $\lim\limits_{n\to\infty}\dfrac{2n^2+3}{\sqrt{2n+4}+\sqrt{5n^3+3n^2+1}}$ 5. $\lim\limits_{n\to\infty}\dfrac{6^{n+2}-5^{n+1}}{5^{n=2}+6^n}$

Вариант 25.

1. $\lim\limits_{n\to\infty}\dfrac{(5n+3)^3-4n^2}{1+2n-7n^3}$ 2. $\lim\limits_{n\to\infty}\dfrac{\sqrt{5n+8}(n^2+6)}{(2n+3)(3n+2)}$

3. $\lim\limits_{n\to\infty}\dfrac{(n+1)^3-(n-1)^3}{(n+1)^2-(n-1)^2}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n^3+5n+2}}{\sqrt{2n^4+1}+3n}$ 5. $\lim\limits_{n\to\infty}\dfrac{3^{n+4}-7^{n+2}}{3^{n+1}+7^{n+1}}$

Вариант 26.

1. $\lim\limits_{n\to\infty}\dfrac{6n^3+2n-3}{(4n^2+5)(2n+6)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+1)^3+(n-1)^3}{4n^2+2n+3}$

3. $\lim\limits_{n\to\infty}\dfrac{5n^4-3n^3+2n+1}{(2n^3+5)\sqrt{3n^4+6)}}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{6n+3}}{\sqrt[3]{2n+8}+\sqrt[3]{n}}$ 5. $\lim\limits_{n\to\infty}\dfrac{4^{n-1}-2^{n+4}}{4^{n+2}+2^{n+1}}$

Вариант 27.

1. $\lim\limits_{n\to\infty}\dfrac{(6n+5)(3n-2)}{4-2n-3n^2}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+2)^2-(n-2)^2}{(2n+3)^2}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n^4+1}(2n+6)}{3n^2+8n+100}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[4]{6n+3}+3\sqrt[4]{2n+3}}{\sqrt[4]{8n+5}}$ 5. $\lim\limits_{n\to\infty}\dfrac{8^{n-1}-4^{n-2}}{8^{n+2}+4^{n+1}}$

Вариант 28.

1. $\lim\limits_{n\to\infty}\dfrac{4n^3-2n^2+3}{(4-6n^2)(3n+1)}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+3)^3-(n-1)^3}{8+99n}$

3. $\lim\limits_{n\to\infty}\dfrac{(3n^2+6)}{\sqrt[3]{2n^5+3}(n+5)}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+6}}{2\sqrt{6n+3}+\sqrt{2n+5}}$ 5. $\lim\limits_{n\to\infty}\dfrac{5^{n+2}-7^{n-1}}{7^{n+1}+5^{n-1}}$

Вариант 29.

1. $\lim\limits_{n\to\infty}\dfrac{(3n^2+5)(6n^2+3)}{1-4n+5n^2-8n^4}$ 2. $\lim\limits_{n\to\infty}\dfrac{(n+3)^3-(n+1)^3}{(2n+3)^2}$ 3. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n+2}(n+3)}{18n^2-6n+5}$

4. $\lim\limits_{n\to\infty}\dfrac{\sqrt{3n^4+5}+\sqrt{2n+3}}{\sqrt{3n^3+8n+1}}$ 5. $\lim\limits_{n\to\infty}\dfrac{9^{n-1}-2^{n+1}}{2^{n-1}+9^{n+2}}$

Вариант 30.

1. $\lim\limits_{n\to\infty}\dfrac{(8n+1)(1-n)}{16n^2+7n+1}$ 2. $\lim\limits_{n\to\infty}\dfrac{(5-n)^2+(n+5)^2}{(5-n)^2-(5+n)^2}$

3. $\lim\limits_{n\to\infty}\dfrac{\sqrt{2n+1}}{\sqrt{5n+2}+\sqrt{7n-1}}$ 4. $\lim\limits_{n\to\infty}\dfrac{\sqrt[3]{5n-1}}{(n+2)(3n-1)}$ 5. $\lim\limits_{n\to\infty}\dfrac{5^{n-1}+2^{n+1}}{3^{n+2}+5^n}$

4.2. Предел функции (приложение 5).

Вариант 1.

1. $\lim\limits_{x\to 4}\dfrac{\sqrt{1+2x}-3}{\sqrt{x}-2}$ 2. $\lim\limits_{x\to 0}\dfrac{\operatorname{tg}\left(\pi\left(1+\frac{x}{2}\right)\right)}{\ln(1+2x)}$ 3. $\lim\limits_{x\to 1}\dfrac{x^2-1}{\ln x}$ 4. $\lim\limits_{x\to\pi}(x-\pi)\operatorname{ctg}x$ 5. $\lim\limits_{x\to 0}\dfrac{1-\cos 3x}{\sin 7x-\arcsin 7x}$ 6. $\lim\limits_{x\to 2}\dfrac{3^x-9}{\sin^2\pi x}$

7. $\lim\limits_{x\to+\infty}\dfrac{\sqrt{2+x}(4x+1)}{x^2+2x+5}$ 8. $\lim\limits_{x\to\frac{\pi}{3}}\dfrac{1-2\cos x}{\sin(\pi-3x)}$ 9. $\lim\limits_{x\to-0}(2-e^{x^2})^{1/\operatorname{tg}\pi x}$ 10. $\lim\limits_{x\to+0}(\sin\pi x)^{1/x}$

Вариант 2.

1. $\lim\limits_{x\to-8}\dfrac{\sqrt{1-x}-3}{2+\sqrt[3]{x}}$ 2. $\lim\limits_{x\to 0}\dfrac{\ln(x^2+1)}{1-\sqrt{1+x^2}}$ 3. $\lim\limits_{x\to\pi}\dfrac{1+\cos 3x}{\sin 7x}$ 4. $\lim\limits_{x\to+0}\sqrt{2x}\ln x^2$ 5. $\lim\limits_{x\to+\infty}\dfrac{(1+2x)^3-8x^3}{(1+2x)^2}$

6. $\lim\limits_{x\to 0}\dfrac{e^{2x}+e^{-x}-2}{\sin^2 2x}$ 7. $\lim\limits_{x\to\frac{1}{3}}\dfrac{2^x-\sqrt[3]{2}}{\ln 3x}$ 8. $\lim\limits_{x\to 0}(\cos 2x)^{3/x}$ 9. $\lim\limits_{x\to+0}(3x)^{x^2}$ 10. $\lim\limits_{x\to 0}\dfrac{7^{2x}-5^{3x}}{2x-\operatorname{arctg}3x}$

Вариант 3.

1. $\lim\limits_{x\to 3}\dfrac{\sqrt{13+x}-2\sqrt{x+1}}{x^2-9}$ 2. $\lim\limits_{x\to 0}\dfrac{\arcsin 2x}{\ln(1+3x)}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt{x^2-x+1}-1}{\ln x}$ 4. $\lim\limits_{x\to+\infty}e^{-3x}\ln 4x$ 5. $\lim\limits_{x\to+\infty}\dfrac{4x^2-3x+2}{\sqrt{x+3}+\sqrt{2x^4+1}}$

6. $\lim\limits_{x\to 0}\dfrac{6^{2x}-7^{-2x}}{\sin 3x-2x}$ 7. $\lim\limits_{x\to 0}\dfrac{\operatorname{arctg}3x}{\ln(1+\sin x)}$ 8. $\lim\limits_{x\to-1}\dfrac{\sqrt[3]{9+x}-2}{2^{x+1}-1}$ 9. $\lim\limits_{x\to+0}(x^3)^{2x}$ 10. $\lim\limits_{x\to 0}(3-2\cos)^{\frac{1}{x^2}}$

Вариант 4.

1. $\lim\limits_{x\to-2}\dfrac{\sqrt[3]{x-6}+2}{x^3+8}$ 2. $\lim\limits_{x\to 0}\dfrac{\sin 2x-\operatorname{tg}3x}{x^2}$ 3. $\lim\limits_{x\to\frac{\pi}{4}}\dfrac{1-\sin 2x}{(\pi-4x)^2}$ 4. $\lim\limits_{x\to 0}x^3\ln 2x$ 5. $\lim\limits_{x\to\frac{\pi}{2}}\arcsin\left(x-\dfrac{\pi}{2}\right)\operatorname{tg}x$

6. $\lim\limits_{x\to 0}\dfrac{1-\cos 4x}{\sqrt{9+2x^2}-3}$ 7. $\lim\limits_{x\to\frac{\pi}{2}}\dfrac{\ln\sin x}{x-\frac{\pi}{2}}$ 8. $\lim\limits_{x\to+\infty}\dfrac{(4x^2+2x+1)(x+3)}{2x^3-6x+1}$ 9. $\lim\limits_{x\to 0}(1+\operatorname{tg}2x)^{1/x}$ 10. $\lim\limits_{x\to 0}(\sin 2x)^x$

Вариант 5.

1. $\lim\limits_{x\to 16}\dfrac{\sqrt[4]{x}-2}{\sqrt{x}-4}$ 2. $\lim\limits_{x\to 0}\dfrac{1-\cos x}{(e^{3x}-1)^2}$ 3. $\lim\limits_{x\to 1}\dfrac{1+\cos\pi x}{\operatorname{tg}\pi x}$ 4. $\lim\limits_{x\to+\infty}\dfrac{\sqrt{3x^2+1}+4x}{2x+8}$ 5. $\lim\limits_{x\to 0}\dfrac{1-\cos 4x}{\sqrt{9+5x}-3}$ 6. $\lim\limits_{x\to\frac{\pi}{2}}\dfrac{\ln\sin x}{\left(x-\frac{\pi}{2}\right)^2}$

7. $\lim\limits_{x\to 0}(1-x^2)^{1/\ln(1+x)}$ 8. $\lim\limits_{x\to-0}(x^2)^{\operatorname{tg}2x}$ 9. $\lim\limits_{x\to\frac{\pi}{2}}\operatorname{ctg}2x(x-\dfrac{\pi}{2})$ 10. $\lim\limits_{x\to 0}\dfrac{e^{3x}-e^{-3x}}{2\arcsin x-\sin x}$

Вариант 6.

1. $\lim\limits_{x\to 8}\dfrac{\sqrt{9+2x}-5}{\sqrt[3]{x}-2}$ 2. $\lim\limits_{x\to 0}\dfrac{e^{4x}-1}{\sin\left(\pi\left(\dfrac{x}{2}+1\right)\right)}$ 3. $\lim\limits_{x\to 0}\dfrac{\operatorname{tg}3x}{\operatorname{tg}x}$ 4. $\lim\limits_{x\to 1}\sqrt[3]{1-x}\ln(x-1)$ 5. $\lim\limits_{x\to+\infty}\dfrac{3^x+7^{x-1}}{3^{x+1}-7^x}$ 6. $\lim\limits_{x\to 0}\dfrac{\sin^2 2x}{1-e^{x^2}}$

7. $\lim\limits_{x\to\frac{1}{2}+}\dfrac{\ln(4x-1)}{\sqrt{x^2-\dfrac{1}{4}}}$ 8. $\lim\limits_{x\to+0}(1+6x)^{\operatorname{ctg}2x}$ 9. $\lim\limits_{x\to 0}(\cos 3x)^{\frac{1}{2x}}$ 10. $\lim\limits_{x\to 0}\dfrac{e^x-e^{-2x}}{\sin 3x-\operatorname{tg}2x}$

Вариант 7.

1. $\lim\limits_{x\to 0}\dfrac{\sqrt{1-2x+x^2}-(x+1)}{2x}$ 2. $\lim\limits_{x\to 0}\dfrac{\arcsin 2x}{2^{-3x}-1}$ 3. $\lim\limits_{x\to 0}\dfrac{5^{2x}-1}{\ln(1+\sin 2x)}$ 4. $\lim\limits_{x\to 2}\dfrac{\sqrt{10+3x}-4}{\sin(3x-6)}$ 5. $\lim\limits_{x\to+\infty}\dfrac{\sqrt{3x+2}}{\sqrt{5x+4}+\sqrt{2x}}$

6. $\lim\limits_{x\to\pi}\dfrac{\sin 2x-\operatorname{tg}3x}{(x-\pi)^2}$ 7. $\lim\limits_{x\to\frac{\pi}{2}}\left(x-\dfrac{\pi}{2}\right)\operatorname{tg}x$ 8. $\lim\limits_{x\to+0}(\operatorname{tg}2x)^{x^2}$ 9. $\lim\limits_{x\to+0}(x^2)^{\frac{1}{\sin 3x}}$ 10. $\lim\limits_{x\to+0}\dfrac{\sqrt{x}-2}{\sqrt[3]{x^2-16}}$

Вариант 8.

1. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{8+x^2}-2}{x^2+x}$ 2. $\lim\limits_{x\to 0}\dfrac{1-\sqrt{\cos x}}{\sin 2x}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt{x^2-2x+2}-1}{\operatorname{tg}\pi x}$ 4. $\lim\limits_{x\to+0}x^3\ln 7x$ 5. $\lim\limits_{x\to 0}\dfrac{3-\sqrt[3]{27-\sin x}}{\ln(2x+1)}$

6. $\lim\limits_{x\to+\infty}\dfrac{x^2\sqrt{4x^2+2x+1}}{2x^3+8x+3}$ 7. $\lim\limits_{x\to 1}\dfrac{2^{\cos\pi x}-\dfrac{1}{2}}{\cos(x-1)-1}$ 8. $\lim\limits_{x\to 0}(1+2x)^{1/\sin 3x}$ 9. $\lim\limits_{x\to+0}(\sin 3x)^x$ 10. $\lim\limits_{x\to-4}\dfrac{\sqrt[3]{x-4}+2}{\sqrt[3]{x^3+64}}$

Вариант 9.

1. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{27+x}-\sqrt[3]{27-x}}{x+2\sqrt[3]{x^4}}$ 2. $\lim\limits_{x\to 0}\dfrac{\sin(5(x+\pi))}{e^{3x}-1}$ 3. $\lim\limits_{x\to 0}\dfrac{\cos 5x-\cos 3x}{\sin^2 x}$ 4. $\lim\limits_{x\to+\infty}e^{-x^2}\ln 4x$ 5. $\lim\limits_{x\to+\infty}\dfrac{\sqrt[3]{2x}+\sqrt[4]{2x^2+3}}{\sqrt{3x+2}}$

6. $\lim\limits_{x\to 0}\dfrac{2^{5x}-1}{3\arcsin 2x}$ 7. $\lim\limits_{x\to\frac{\pi}{3}}\dfrac{\ln(1+\cos x)}{\dfrac{\pi}{2}-x}$ 8. $\lim\limits_{x\to 0}(\cos\pi x)^{3/x^2}$ 9. $\lim\limits_{x\to+0}(x^3)^{\sqrt{2x}}$ 10. $\lim\limits_{x\to 0}\dfrac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt[4]{1+x}-\sqrt[4]{1-x}}$

Вариант 10.

1. $\lim\limits_{x\to 1}\dfrac{\sqrt[3]{x}-1}{\sqrt{1+x}-\sqrt{2x}}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt{x+1}-1}{\sin(\pi(x+2))}$ 3. $\lim\limits_{x\to 2\pi}\dfrac{\sin 7x-\sin 2x}{e^{x^2}-e^{4\pi^2}}$ 4. $\lim\limits_{x\to\frac{\pi}{3}}(x-\dfrac{\pi}{3})\operatorname{ctg}3x$ 5. $\lim\limits_{x\to+\infty}\dfrac{(x^2+3)(2x+8)}{\sqrt[3]{2x^6+5x+2}}$

6. $\lim\limits_{x\to 1}\dfrac{\sqrt[3]{2-x^2}-1}{1+\cos\pi x}$ 7. $\lim\limits_{x\to 0}(1-\sin 2x)^{5/x}$ 8. $\lim\limits_{x\to+0}(\sin 3x)^{\operatorname{tg}2x}$ 9. $\lim\limits_{x\to 0}\dfrac{1-\cos 10x}{e^{5x^2}-1}$ 10. $\lim\limits_{x\to 16}\dfrac{\sqrt{9+x}-5}{\sqrt[4]{x}-2}$

Вариант 11.

1. $\lim\limits_{x\to-2}\dfrac{\sqrt[3]{x-6}+2}{\sqrt[3]{x^3+8}}$ 2. $\lim\limits_{x\to 0}\dfrac{3x^2-5x}{\sin^2 5x}$ 3. $\lim\limits_{x\to 1}\dfrac{\cos\left(\dfrac{\pi x}{2}\right)}{1-\sqrt[3]{x^2}}$ 4. $\lim\limits_{x\to\frac{\pi}{4}}\operatorname{tg}2x\left(x-\dfrac{\pi}{4}\right)$ 5. $\lim\limits_{x\to\frac{\pi}{3}}\dfrac{\left(x-\dfrac{\pi}{3}\right)^2}{\dfrac{1}{2}-\cos x}$

6. $\lim\limits_{x\to+\infty}\dfrac{\sqrt{2x+7}+\sqrt{3x+2}}{\sqrt{5x+4}}$ 7. $\lim\limits_{x\to 2}\dfrac{\ln(3x-5)}{\sin 2\pi x}$ 8. $\lim\limits_{x\to 0}\left(2-e^{-x^2}\right)^{\frac{1}{3x^2}}$ 9. $\lim\limits_{x\to-0}(\operatorname{tg}4x)^{2x}$ 10. $\lim\limits_{x\to 4}\dfrac{\sqrt[4]{4x}-4}{\sqrt{8+x}-\sqrt{3x}}$

Вариант 12.

1. $\lim\limits_{x\to 2}\dfrac{\sqrt[3]{4x}-2}{\sqrt{2+x}-\sqrt{2x}}$ 2. $\lim\limits_{x\to 0}\dfrac{2\sin\left(\pi\left(x+1\right)\right)}{\ln\left(1+3x\right)}$ 3. $\lim\limits_{x\to 2}\dfrac{\ln\left(5-2x\right)}{\sqrt{10-3x}-2}$ 4. $\lim\limits_{x\to +0}\operatorname{tg}5x\ln 2x$ 5. $\lim\limits_{x\to -\infty}\dfrac{x^3-3x+2}{\left(2x+1\right)\left(x+8\right)}$

6. $\lim\limits_{x\to 0}\dfrac{\arcsin^2 4x}{\sqrt{4+2x}-2}$ 7. $\lim\limits_{x\to \pi}\dfrac{\ln\cos 2x}{\left(x-\pi\right)^2}$ 8. $\lim\limits_{x\to +0}\left(2x\right)^{3/x}$ 9. $\lim\limits_{x\to 0}\left(1+\operatorname{tg}3x\right)^{1/\sin x}$ 10. $\lim\limits_{x\to 1}\dfrac{\sqrt[5]{x+1}-\sqrt[5]{2}}{\sqrt[3]{x^4-1}}$

Вариант 13.

1. $\lim\limits_{x\to 1}\dfrac{\sqrt{x+3}-2}{3x^2-3}$ 2. $\lim\limits_{x\to 0}\dfrac{\sqrt{4+2x}-2}{3\operatorname{arctg}x}$ 3. $\lim\limits_{x\to 1}\dfrac{\sqrt{x^2-3x+3}-1}{\sin\pi x}$ 4. $\lim\limits_{x\to +0}\sqrt{x^3}\ln 4x$ 5. $\lim\limits_{x\to +\infty}\dfrac{5x+1-4x^2}{\left(3x+2\right)\left(x-8\right)}$

6. $\lim\limits_{x\to -0}\dfrac{3^{2x}-1}{\ln\left(2x^2+1\right)}$ 7. $\lim\limits_{x\to 4}\dfrac{\sqrt{9+4x}-5}{\sin\left(2x-8\right)}$ 8. $\lim\limits_{x\to +\infty}\dfrac{e^{2x}}{x^2+3x}$ 9. $\lim\limits_{x\to +0}\left(\operatorname{tg}3x\right)^{\frac{1}{2x}}$ 10. $\lim\limits_{x\to +0}\left(\sqrt{2x}\right)^{\operatorname{tg}4x}$

Вариант 14.

1. $\lim\limits_{x\to 4}\dfrac{\sqrt{x}-2}{\sqrt[3]{x^2-16}}$ 2. $\lim\limits_{x\to 0}\dfrac{1-\cos 10x}{2^{x^2}-1}$ 3. $\lim\limits_{x\to \pi}\dfrac{\sin 5x-\sin 3x}{\operatorname{tg}3x}$ 4. $\lim\limits_{x\to 0}5x^2\operatorname{ctg}3x$ 5. $\lim\limits_{x\to +\infty}\dfrac{\sqrt{3x-1}}{\sqrt{5x+8}+\sqrt{3x+2}}$

6. $\lim\limits_{x\to 1}\dfrac{\operatorname{ctg}\dfrac{\pi x}{2}}{1-\sqrt[3]{2-x}}$ 7. $\lim\limits_{x\to +0}\left(3x\right)^{\operatorname{tg}2x}$ 8. $\lim\limits_{x\to 0}\left(1+\operatorname{tg}x\right)^{\frac{1}{2x}}$ 9. $\lim\limits_{x\to 0}\dfrac{1-e^{-2x}}{\sin 3x-x^2}$ 10. $\lim\limits_{x\to 3}\dfrac{\sqrt{x+13}-2\sqrt{x+1}}{x^3-27}$

Вариант 15.

1. $\lim\limits_{x\to -2}\dfrac{\sqrt[3]{x-6}+2}{x^2-4}$ 2. $\lim\limits_{x\to 0}\dfrac{1-\sqrt{3x+1}}{\cos\left(\pi\dfrac{\left(x+1\right)}{2}\right)}$ 3. $\lim\limits_{x\to \pi}\dfrac{\sqrt{\pi^2-x^2}}{\sin 2x}$ 4. $\lim\limits_{x\to 0}7x\operatorname{ctg}2x$ 5. $\lim\limits_{x\to -\infty}\dfrac{\left(3x^2+5\right)\left(x+2\right)}{4x^2+6x+3}$

6. $\lim\limits_{x\to 0}\dfrac{3-\sqrt[3]{27-x}}{\ln\left(2x+1\right)}$ 7. $\lim\limits_{x\to 0}\left(\cos\pi x\right)^{\frac{1}{2x}}$ 8. $\lim\limits_{x\to +\infty}\dfrac{e^{2x}}{\ln x^3}$ 9. $\lim\limits_{x\to +0}\left(\operatorname{tg}3x\right)^{\frac{1}{\sin x}}$ 10. $\lim\limits_{x\to 0}\left(1+x^2\right)^{\operatorname{ctg}2x}$

Вариант 16.

1. $\lim\limits_{x\to 4}\dfrac{\sqrt[3]{16x}-4}{\sqrt{4+x}-\sqrt{2x}}$ 2. $\lim\limits_{x\to 0}\dfrac{9\ln\left(1-2x\right)}{4\operatorname{arctg}3x}$ 3. $\lim\limits_{x\to 3}\dfrac{2^x-8}{\sin^2\pi x}$ 4. $\lim\limits_{x\to +0}\operatorname{tg}x\ln 3x$ 5. $\lim\limits_{x\to 0}\dfrac{e^x+e^{-3x}-2}{\cos 2x-1}$

6. $\lim\limits_{x\to +\infty}\dfrac{\sqrt{3x+7}+\sqrt[4]{3x^2+1}}{\sqrt{2x+3}}$ 7. $\lim\limits_{x\to 0}(1-\sin\dfrac{x}{2})^{\frac{3}{x}}$ 8. $\lim\limits_{x\to \frac{1}{3}}\dfrac{e^{2x}-\sqrt[3]{e^2}2}{\ln 3x}$ 9. $\lim\limits_{x\to 0}(\cos 2x)^{\frac{3}{x}}$ 10. $\lim\limits_{x\to +0}\left(x^3\right)^{\sqrt{x}}$

Вариант 17.

1. $\lim\limits_{x\to 8}\dfrac{\sqrt{9+2x}-5}{\sqrt[3]{x^2}-4}$ 2. $\lim\limits_{x\to 0}\dfrac{\operatorname{tg}x}{\arcsin 3x^2}$ 3. $\lim\limits_{x\to \frac{\pi}{2}}\dfrac{\ln 2x-\ln\pi}{\cos^2 x}$ 4. $\lim\limits_{x\to +0}\sqrt[3]{2x}\ln 5x$ 5. $\lim\limits_{x\to +\infty}\dfrac{\sqrt{x^2+3x}\left(2x+8\right)}{3x^2-2x+1}$

6. $\lim\limits_{x\to 0}\dfrac{\operatorname{arctg}3x}{\sqrt[4]{16+3x}-2}$ 7. $\lim\limits_{x\to 2}\dfrac{\ln\left(7-3x\right)}{e^{x^2}-e^4}$ 8. $\lim\limits_{x\to +0}(2-e^x)^{1/3x^2}$ 9. $\lim\limits_{x\to 0}(1+2x)^{\operatorname{ctg}3x}$ 10. $\lim\limits_{x\to 0}\dfrac{\sqrt{1+2x}-\sqrt{1-3x}}{\sqrt[3]{x^2}}$

Вариант 18.

1. $\lim\limits_{x\to -8}\dfrac{10-x-6\sqrt{1-x}}{2+\sqrt[3]{x}}$ 2. $\lim\limits_{x\to 0}\dfrac{\ln\left(\sin x+1\right)}{\sin 4x}$ 3. $\lim\limits_{x\to \pi}\dfrac{\cos 3x-\cos x}{\operatorname{tg}7x}$ 4. $\lim\limits_{x\to +0}\sqrt[3]{x}\ln x^2$ 5. $\lim\limits_{x\to 0}\dfrac{1-\cos 2x}{e^{-3x}-1}$

6. $\lim\limits_{x\to +\infty}\dfrac{\left(x+8\right)\left(2x+3\right)}{4x^2+5x+6}$ 7. $\lim\limits_{x\to 0}\ln 3x\operatorname{tg}3x$ 8. $\lim\limits_{x\to +0}\left(x^2\right)^{\sqrt[3]{x}}$ 9. $\lim\limits_{x\to 0}\left(1+\sin x\right)^{\operatorname{ctg}x}$ 10. $\lim\limits_{x\to 3}\dfrac{\sqrt[3]{9x}-3}{\sqrt{2x+3}-\sqrt{3x}}$

Вариант 19.

1. $\lim\limits_{x\to\frac{1}{3}}\dfrac{\sqrt[3]{\frac{x}{9}}-\frac{1}{3}}{\sqrt{x+\frac{1}{3}}-\sqrt{2x}}$ 2. $\lim\limits_{x\to 0}\dfrac{\operatorname{arctg}2x}{\sin\left(2\pi\left(x+10\right)\right)}$ 3. $\lim\limits_{x\to\pi}\dfrac{e^{2\pi}-e^{2x}}{\sin 5x-\sin 3x}$ 4. $\lim\limits_{x\to 0}3x\operatorname{ctg}7x$ 5. $\lim\limits_{x\to-\infty}\dfrac{4x^3-2x+3}{\left(2x+5\right)\left(3x+2\right)}$

6. $\lim\limits_{x\to 0}\dfrac{2^{x^2}-1}{\ln\left(1+3x^2\right)}$ 7. $\lim\limits_{x\to 1}\dfrac{\cos\left(\frac{\pi x}{2}\right)}{1-\sqrt[3]{x^2}}$ 8. $\lim\limits_{x\to+0}\left(2-e^x\right)^{1/x^2}$ 9. $\lim\limits_{x\to+0}\left(\operatorname{tg}2x\right)^{3x}$ 10. $\lim\limits_{x\to\frac{\pi}{2}}\dfrac{2^{\cos x}-1}{\ln\sin x}$

Вариант 20.

1. $\lim\limits_{x\to\frac{1}{4}}\dfrac{\sqrt[3]{\frac{x}{16}}-\frac{1}{4}}{\sqrt{x+\frac{1}{4}}-\sqrt{2x}}$ 2. $\lim\limits_{x\to 0}\dfrac{2^{3x}-1}{\ln\left(1+2x\right)}$ 3. $\lim\limits_{x\to 2}\dfrac{\ln\left(9-x^3\right)}{\sin 2\pi x}$ 4. $\lim\limits_{x\to+0}\sqrt{2x}\ln 4x$ 5. $\lim\limits_{x\to+\infty}\dfrac{\sqrt[3]{3x+2}+2\sqrt[3]{x+3}}{\sqrt[3]{x^2+2x+1}}$

6. $\lim\limits_{x\to 0}\dfrac{\ln\left(1+x^2\right)}{2-\sqrt[3]{8+x^2}}$ 7. $\lim\limits_{x\to\pi}\dfrac{\cos\frac{x}{2}}{e^{\sin 2x}-1}$ 8. $\lim\limits_{x\to+0}(3x)^{x^2}$ 9. $\lim\limits_{x\to 0}(1-3x)^{\operatorname{ctg}2x}$ 10. $\lim\limits_{x\to-2}\dfrac{\operatorname{tg}\pi x}{x^2-4}$

Вариант 21.

1. $\lim\limits_{x\to+0}\dfrac{\sqrt{1+3x}-\sqrt{1-x}}{\sqrt[5]{2x}}$ 2. $\lim\limits_{x\to 0}\dfrac{\arcsin 3x}{\sqrt{2+x}-\sqrt{2}}$ 3. $\lim\limits_{x\to-2}\dfrac{\operatorname{tg}\pi x}{\sqrt{x+2}}$ 4. $\lim\limits_{x\to+\infty}e^{-4x}\ln 3x$ 5. $\lim\limits_{x\to+\infty}\dfrac{\sqrt{3x+1}+\sqrt{2x}}{\sqrt{5x+3}}$

6. $\lim\limits_{x\to 4}\dfrac{\sqrt[3]{9+4x}-\sqrt[3]{5}}{\sin\left(3x-12\right)}$ 7. $\lim\limits_{x\to 0}\dfrac{5^{2x}-1}{\ln\left(1+3x\right)}$ 8. $\lim\limits_{x\to+0}\left(x^2\right)^{\operatorname{tg}3x}$ 9. $\lim\limits_{x\to 0}(1+3x)^{\operatorname{ctg}x}$ 10. $\lim\limits_{x\to 2}\dfrac{\operatorname{arctg}\left(x^2-4\right)}{\sin 2\pi x}$

Вариант 22.

1. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{27+x}-\sqrt[3]{27-x}}{\sqrt[3]{x^2}+3x}$ 2. $\lim\limits_{x\to 0}\dfrac{1-\cos^2 x}{4x^2}$ 3. $\lim\limits_{x\to\pi}\dfrac{1-\sin\frac{x}{2}}{\pi-x}$ 4. $\lim\limits_{x\to\pi}\left(x-\pi\right)^2\operatorname{ctg}x$ 5. $\lim\limits_{x\to+\infty}\dfrac{x^3+2x+2}{\left(x+4\right)\left(3x^3+4\right)}$

6. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{8+x^3}-2}{\operatorname{arctg}3x}$ 7. $\lim\limits_{x\to 1}\dfrac{\ln\cos\left(x-1\right)}{3^{2x}-9}$ 8. $\lim\limits_{x\to 0}(1+3x^2)^{\frac{1}{\sin 2x}}$ 9. $\lim\limits_{x\to+0}(\sqrt[3]{x})^{x^2}$ 10. $\lim\limits_{x\to 8}\dfrac{\sqrt{1+x}-3}{2-\sqrt[3]{x}}$

Вариант 23.

1. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{8+3x-x^2}-2}{\sqrt{x^2+x}}$ 2. $\lim\limits_{x\to 0}\dfrac{2x}{\operatorname{tg}\left(2\pi\left(x+\frac{1}{2}\right)\right)}$ 3. $\lim\limits_{x\to\frac{\pi}{3}}\dfrac{1-2\cos x}{\left(\pi-3x\right)^2}$ 4. $\lim\limits_{x\to+0}\sqrt{x}\operatorname{ctg}2x$ 5. $\lim\limits_{x\to+\infty}\dfrac{\sqrt{5+3x}+\sqrt{3+2x}}{\sqrt{8+4x}}$

6. $\lim\limits_{x\to 0}\dfrac{\sqrt{1+\sin 3x}-1}{e^{2x}-1}$ 7. $\lim\limits_{x\to 2}\dfrac{2^{\cos\pi x}-2}{\ln\left(4x-7\right)}$ 8. $\lim\limits_{x\to+0}(\sin 2x)^{\operatorname{tg}4x}$ 9. $\lim\limits_{x\to+\infty}(x^2)^{\frac{1}{2x^2}}$ 10. $\lim\limits_{x\to-1}\dfrac{\sin 2\pi x}{\sqrt[3]{1-x^2}}$

Вариант 24.

1. $\lim\limits_{x\to 8}\dfrac{\sqrt{9+2x}-5}{\sqrt[3]{x}-2}$ 2. $\lim\limits_{x\to 0}\dfrac{4x}{\operatorname{tg}\left(\pi\left(2+x\right)\right)}$ 3. $\lim\limits_{x\to 2}\dfrac{\operatorname{arctg}\left(x^2-2x\right)}{\sin 3\pi x}$ 4. $\lim\limits_{x\to+0}x^2\ln 3x$ 5. $\lim\limits_{x\to+\infty}\dfrac{\sqrt[4]{2x^2+8}}{\sqrt{x+2}+\sqrt{3x}}$

6. $\lim\limits_{x\to 2}\dfrac{2^{\cos\pi x}-2}{\ln\left(4x-7\right)}$ 7. $\lim\limits_{x\to 0}\dfrac{\sqrt[3]{27+2x}-3}{\ln\left(2x+1\right)}$ 8. $\lim\limits_{x\to+0}\left(1+\sin 5x\right)^{1/3x}$ 9. $\lim\limits_{x\to-0}(\sqrt[3]{x})^{\operatorname{tg}2x}$ 10. $\lim\limits_{x\to 1}\dfrac{\sqrt[4]{x}-1}{\sqrt{2x+3}-\sqrt{3x+2}}$

Вариант 25.

1. $\lim\limits_{x\to -2}\dfrac{\sqrt[3]{1+2x}-\sqrt[3]{9}}{\sqrt[4]{4x}-2}$ 2. $\lim\limits_{x\to 0}\dfrac{\operatorname{tg}2\pi x}{\ln(1+3x)}$ 3. $\lim\limits_{x\to -1}\dfrac{x^2-1}{\ln(x+2)}$ 4. $\lim\limits_{x\to \frac{\pi}{2}}\left(x-\dfrac{\pi}{2}\right)\operatorname{tg}x$ 5. $\lim\limits_{x\to 0}\dfrac{1-\cos 4x}{\arcsin 7x-\sin 2x}$

6. $\lim\limits_{x\to 3}\dfrac{2^{x+1}-16}{\sin^2\pi x}$ 7. $\lim\limits_{x\to +\infty}\dfrac{(x+1)\sqrt[3]{x^2+3}}{x^2+2x+3}$ 8. $\lim\limits_{x\to \frac{\pi}{4}}\dfrac{1+\cos 4x}{\sin(\pi-4x)}$ 9. $\lim\limits_{x\to +0}(1+2x)^{\operatorname{ctg}\pi x}$ 10. $\lim\limits_{x\to +0}(\sin 4x)^{\frac{1}{2x}}$

Вариант 26.

1. $\lim\limits_{x\to -2}\dfrac{\sqrt[3]{4x}+2}{(2+x)^2}$ 2. $\lim\limits_{x\to 0}\dfrac{\ln(1+3x)}{1-\sqrt{x^3+1}}$ 3. $\lim\limits_{x\to \frac{\pi}{2}}\dfrac{\cos 3x}{1-\sin 5x}$ 4. $\lim\limits_{x\to +0}\sqrt[3]{x}\ln 2x^2$ 5. $\lim\limits_{x\to +\infty}\dfrac{(x+1)^3-(x-1)^3}{4x^2+3x+2}$ 6. $\lim\limits_{x\to 0}\dfrac{e^{3x}-e^{-x}}{\sin^2 x}$

7. $\lim\limits_{x\to \frac{1}{5}}\dfrac{2^{5x}-2}{\ln(5x)}$ 8. $\lim\limits_{x\to 0}(1-\sin 4x)^{\frac{4}{x}}$ 9. $\lim\limits_{x\to +0}(x^2)^{3x}$ 10. $\lim\limits_{x\to 0}\dfrac{4^{3x}-3^{2x}}{2x-\arcsin 4x}$

Вариант 27.

1. $\lim\limits_{x\to 2}\dfrac{\sqrt{x+14}-\sqrt{8x}}{x^2-4}$ 2. $\lim\limits_{x\to 0}\dfrac{\arcsin 2x^2}{\ln(1+4x)}$ 3. $\lim\limits_{x\to 2}\dfrac{\sqrt{x^2+5}-3}{\ln(3x-5)}$ 4. $\lim\limits_{x\to +\infty}e^{-2x}\ln 3x$ 5. $\lim\limits_{x\to +\infty}\dfrac{5x^4-2x+3}{(3x^2+5)(4x^2+1)}$

6. $\lim\limits_{x\to 0}\dfrac{4^{2x}-7^{-x}}{\sin 4x-5x}$ 7. $\lim\limits_{x\to 0}\dfrac{\arcsin 4x}{\ln(1+\sin 2x)}$ 8. $\lim\limits_{x\to -1}\dfrac{\sqrt{2x+11}-3}{4^{x+1}-1}$ 9. $\lim\limits_{x\to +0}(x^2)^{3x}$ 10. $\lim\limits_{x\to 0}(2-\cos 2x)^{1/2x}$

Вариант 28.

1. $\lim\limits_{x\to 2}\dfrac{\sqrt[3]{x+6}-2}{x^2-x-6}$ 2. $\lim\limits_{x\to 0}\dfrac{1-e^{3x}}{\sin(\pi+2x)}$ 3. $\lim\limits_{x\to \frac{\pi}{2}}\dfrac{\operatorname{tg}5x}{\cos x}$ 4. $\lim\limits_{x\to 3}\sqrt{1-\dfrac{x}{3}}\ln(3-x)$ 5. $\lim\limits_{x\to +\infty}\dfrac{2^{x+1}-5^{x-1}}{2^{x+2}+5^{x+1}}$ 6. $\lim\limits_{x\to 0}\dfrac{\sin 3x}{1-e^{x^2}}$

7. $\lim\limits_{x\to \frac{1}{4}}\dfrac{\ln(8x-1)}{\sqrt{2-\sin 2\pi x}}$ 8. $\lim\limits_{x\to 0}(1+5x)^{\operatorname{ctg}2x}$ 9. $\lim\limits_{x\to +0}(\cos 2x)^{\frac{1}{\sqrt{x}}}$ 10. $\lim\limits_{x\to 1}\dfrac{3^{5x-3}-3^{2x^2}}{\sqrt[3]{4-3x}-1}$

Вариант 29.

1. $\lim\limits_{x\to 27}\dfrac{\sqrt[3]{10+2x}-4}{\sqrt[3]{x}-3}$ 2. $\lim\limits_{x\to 0}\dfrac{e^{5x}-1}{\sin(\pi(2x+1))}$ 3. $\lim\limits_{x\to 0}\dfrac{\operatorname{tg}5x}{\operatorname{tg}x-\operatorname{tg}4x}$ 4. $\lim\limits_{x\to \frac{1}{4}}\sqrt[3]{\dfrac{1}{4}-x}\ln(4x-1)$ 5. $\lim\limits_{x\to +\infty}\dfrac{6^x+5^{x+4}}{3^{x+1}-6^{3x-1}}$

6. $\lim\limits_{x\to 0}\dfrac{\sin^2 2x+\cos 2x-1}{1-e^{x^2}}$ 7. $\lim\limits_{x\to \frac{1}{3}+0}\dfrac{\ln(6x-1)}{\sqrt{x^2-\frac{1}{9}}}$ 8. $\lim\limits_{x\to +0}(1-3x)^{\operatorname{ctg}7x}$ 9. $\lim\limits_{x\to +0}(\cos 3x)^{\frac{1}{\sqrt[4]{16x}}}$ 10. $\lim\limits_{x\to 0}\dfrac{e^{4x}-3^{-2x}}{\sin 3x-\operatorname{tg}4x}$

Вариант 30.

1. $\lim\limits_{x\to 0}\dfrac{\sqrt{4-4x+x^2}-(x+2)}{8x}$ 2. $\lim\limits_{x\to 0}\dfrac{\arcsin^2 5x}{2^{-7x^2}-1}$ 3. $\lim\limits_{x\to 0}\dfrac{8^{6x^3}-1}{\ln(1+\sin^3 x)}$ 4. $\lim\limits_{x\to 1}\dfrac{\sqrt{10+6x}-4}{\sin(3x-3)}$ 5. $\lim\limits_{x\to +\infty}\dfrac{\sqrt{7x+2}}{\sqrt{5x-14}+\sqrt{8x}}$

6. $\lim\limits_{x\to 2\pi}\dfrac{\sin^2 2x-\operatorname{tg}^2 8x}{(x-2\pi)^2}$ 7. $\lim\limits_{x\to \pi}(x-\pi)\operatorname{tg}\left(x-\dfrac{\pi}{2}\right)$ 8. $\lim\limits_{x\to +0}(\operatorname{tg}8x)^{x^3}$ 9. $\lim\limits_{x\to 1+0}(x^2-1)^{\frac{1}{\sin(x-1)}}$ 10. $\lim\limits_{x\to +0}\dfrac{\sqrt{x+4}-2}{\sqrt[3]{x^2-8}+2}$

СОДЕРЖАНИЕ.