

6. Пределы. Непрерывность.

В примерах 1, 3, 4, 6 найти пределы указанных функций, не пользуясь правилом Лопиталя. В примере 2 указать порядок малости бесконечно малой функции $\alpha(x)$ относительно бесконечно малой функции $\beta(x)$ при $x \rightarrow 0$. В примере 5 найти: точки разрыва функции, если они существуют, односторонние пределы и скачок функции в точках разрыва; сделать чертеж.

Вариант 1.

$$1. \lim_{x \rightarrow x_0} \frac{2x^2 - 5x - 3}{3x^2 - 4x - 15} \text{ при } x_0 = 2, x_0 = 3, x_0 = \infty.$$

$$2. \alpha(x) = \sqrt{\sin^2 x + x^4}, \beta(x) = x.$$

$$3. \lim_{x \rightarrow 4} \frac{\sqrt{x-1} - \sqrt{7-x}}{x-4}.$$

$$4. \lim_{x \rightarrow 0} \frac{3x}{\operatorname{arctg} 4x}.$$

$$5. y = \begin{cases} -2x, & x < -1, \\ x^2 + 1, & -1 \leq x \leq 2, \\ x - 1, & x \geq 2. \end{cases}$$

$$6. \lim_{x \rightarrow \infty} \left(\frac{3x+2}{3x-4} \right)^{2x-3}.$$

Вариант 2.

$$1. \lim_{x \rightarrow x_0} \frac{4x^2 - 7x - 2}{2x^2 - x - 6} \text{ при } x_0 = 0, x_0 = 2, x_0 = \infty.$$

$$2. \alpha(x) = \ln(1 - 5x^3), \beta(x) = x.$$

$$3. \lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x+2} - \sqrt{6-x}}.$$

$$4. \lim_{x \rightarrow 0} \frac{\operatorname{tg} 2x}{\sin 5x}.$$

$$5. y = \begin{cases} x+2, & x < -2, \\ 4-x^2, & -2 \leq x \leq 1, \\ 3-2x, & x > 1. \end{cases}$$

$$6. \lim_{x \rightarrow \infty} \left(\frac{2x-3}{2x+5} \right)^{3x-2}.$$

Вариант 3.

$$1. \lim_{x \rightarrow x_0} \frac{2x^2 + 5x - 3}{x^2 + 5x + 6} \text{ при } x_0 = 3, x_0 = -3, x_0 = \infty.$$

$$2. \alpha(x) = \operatorname{tg} x - \sin x, \beta(x) = x.$$

$$3. \lim_{x \rightarrow 5} \frac{\sqrt{x-1} - \sqrt{9-x}}{x-5}$$

$$4. \lim_{x \rightarrow 0} \frac{\ln(1+x)}{3^{2x} - 1}.$$

$$5. y = \begin{cases} -3-x, & x < -2, \\ x^2-5, & -2 \leq x \leq 3, \\ 7-2x, & x \geq 3. \end{cases}$$

$$6. \lim_{x \rightarrow \infty} \left(\frac{2x-1}{2x+5} \right)^{2-5x}.$$

Вариант 4.

$$1. \lim_{x \rightarrow x_0} \frac{3x^2 - 5x - 2}{2x^2 - x - 6} \text{ при } x_0 = -1, x_0 = 2, x_0 = \infty.$$

$$2. \alpha(x) = 1 + x \cdot \sin x - \cos 2x, \beta(x) = x.$$

$$3. \lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x+3} - \sqrt{7-x}}.$$

$$4. \lim_{x \rightarrow 0} \frac{\sin 3x}{\operatorname{tg} 5x}.$$

$$5. y = \begin{cases} -3-x, & x < 1, \\ x^2-4, & 1 \leq x \leq 3, \\ 2x-5, & x \geq 3. \end{cases}$$

$$6. \lim_{x \rightarrow \infty} \left(\frac{4x-1}{4x+3} \right)^{x+2}.$$

Вариант 5.

$$1. \lim_{x \rightarrow x_0} \frac{2x^2 + 15x + 25}{5 - 4x - x^2} \text{ при } x_0 = -5, x_0 = 2, x_0 = \infty.$$

$$2. \alpha(x) = \cos 3x - \cos x, \beta(x) = x.$$

$$3. \lim_{x \rightarrow 3} \frac{\sqrt{2x^2 + 3} - 3}{x^2 - 9}.$$

$$4. \lim_{x \rightarrow 0} \frac{1 - \cos^2 2x}{\operatorname{tg} x^2}.$$

$$5. y = \begin{cases} 2x+1, & x < -1, \\ x^2, & -1 \leq x \leq 2, \\ 6-x, & x > 2. \end{cases}$$

$$6. \lim_{x \rightarrow \infty} \left(\frac{1-3x}{2+3x} \right)^{2x-3}.$$

Вариант 6.

$$1. \lim_{x \rightarrow x_0} \frac{4x^2 + 7x + 3}{2x^2 + x - 1} \text{ при } x_0 = -1, x_0 = 5, x_0 = \infty.$$

$$2. \alpha(x) = 9^{\sin^2 x} - 1, \beta(x) = x.$$

$$3. \lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x^2 - 6x + 8}.$$

$$4. \lim_{x \rightarrow 0} \frac{\operatorname{tg} x - \sin x}{1 - \cos x}.$$

$$5. y = \begin{cases} 2-x, & x < 0, \\ \sin x, & 0 \leq x < \pi, \\ x-\pi, & x \geq \pi. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{5-2x}{3-2x} \right)^{7x}.$$

Вариант 7.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{2x^2 - 9x + 9}{x^2 - 5x + 6} \text{ при } x_0 = -1, x_0 = 3, x_0 = \infty. \\ 2. \alpha(x) = \sqrt[3]{x+1} - 1, \beta(x) = x. \\ 3. \lim_{x \rightarrow -1} \frac{x+1}{\sqrt{3x+7}-2}. \quad 4. \lim_{x \rightarrow 0} \frac{\sin^2 3x}{\ln(1-2x)}. \\ 5. y = \begin{cases} x+1, & x \leq 0, \\ \cos x, & 0 < x < \pi/2, \\ 2, & x \geq \pi/2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{5x-3}{5x-7} \right)^{1-4x}. \end{aligned}$$

Вариант 8.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{5x - x^2 - 4}{x^2 - 2x - 8} \text{ при } x_0 = 5, x_0 = 4, x_0 = \infty. \\ 2. \alpha(x) = \sqrt{x} + \sqrt{x}, \beta(x) = x. \\ 3. \lim_{x \rightarrow 1} \frac{\sqrt{x+3}-2}{\sqrt{x}-1}. \quad 4. \lim_{x \rightarrow 0} \frac{\arcsin 6x}{x^2 - 2x}. \\ 5. y = \begin{cases} 2x, & x < 0, \\ \sin x, & 0 \leq x \leq \pi, \\ -3, & x > \pi. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{4x+1}{4x+5} \right)^{3x+2}. \end{aligned}$$

Вариант 9.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 - 2x - 8}{2x^2 + 5x + 2} \text{ при } x_0 = 3, x_0 = -2, x_0 = \infty. \\ 2. \alpha(x) = \exp(x^2) - \cos x, \beta(x) = x. \\ 3. \lim_{x \rightarrow 5} \frac{x^2 - 25}{\sqrt{2x-1}-3}. \quad 4. \lim_{x \rightarrow 0} \frac{1 - \cos 6x}{x \cdot \sin 5x}. \end{aligned}$$

$$5. y = \begin{cases} x^2, & x \leq 0, \\ \cos x, & 0 < x < \pi, \\ -1, & x \geq \pi. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{3x-1}{2x+3} \right)^{1-5x}.$$

Вариант 10.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{3x^2 - 2x - 1}{x^2 - 4x + 3} \text{ при } x_0 = -2, x_0 = 1, x_0 = \infty. \\ 2. \alpha(x) = \sin 2x - 2 \sin x, \beta(x) = x. \\ 3. \lim_{x \rightarrow -3} \frac{\sqrt{1-x} - 2}{4 - \sqrt{1-5x}}. \quad 4. \lim_{x \rightarrow 0} \frac{\sin 3x}{\ln(1+6x)}. \\ 5. y = \begin{cases} x^2 - 1, & x < 0, \\ \cos x, & 0 \leq x \leq \pi/2, \\ x - \pi/2, & x > \pi/2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{x+3}{2x-1} \right)^{1-4x}. \end{aligned}$$

Вариант 11.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{6-x-x^2}{3x^2+8x-3} \text{ при } x_0 = -3, x_0 = 4, x_0 = \infty. \\ 2. \alpha(x) = \sqrt{2x^2+1} - 1, \beta(x) = x. \\ 3. \lim_{x \rightarrow -2} \frac{\sqrt{x+7} - \sqrt{3-x}}{x+2}. \quad 4. \lim_{x \rightarrow 0} \frac{1 - \cos 4x}{x \cdot \exp(2x-1)}. \\ 5. y = \begin{cases} 3x^2, & x \leq 0, \\ x/2, & 0 < x \leq 1, \\ x+2, & x > 1. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{2-5x}{6+5x} \right)^{x-7}. \end{aligned}$$

Вариант 12.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^3 - 1}{5x^2 - 4x - 1} \text{ при } x_0 = 5, x_0 = 1, x_0 = \infty. \\ 2. \alpha(x) = \sqrt{x^3+1} - 1, \beta(x) = x. \\ 3. \lim_{x \rightarrow -1} \frac{x+1}{\sqrt{x+5} - \sqrt{3-x}}. \quad 4. \lim_{x \rightarrow 0} \frac{1 - \cos^3 x}{x - \sin 2x}. \end{aligned}$$

$$5. y = \begin{cases} x, & x < 0, \\ x^2 + 1, & 0 \leq x < 2, \\ x + 1, & x \geq 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(1 - \frac{2}{3x - 4} \right)^{3x - 1}.$$

Вариант 13.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 + 2x - 8}{8 - x^3} \text{ при } x_0 = -2, x_0 = 2, x_0 = \infty. \\ 2. \alpha(x) = \arcsin(\sqrt{x^2 + 4} - 2), \beta(x) = x. \\ 3. \lim_{x \rightarrow 2} \frac{\sqrt{x + 4} - \sqrt{8 - x}}{x - 2}. \quad 4. \lim_{x \rightarrow 0} \frac{\operatorname{arctg} 8x}{4x^2 + x}. \\ 5. y = \begin{cases} \sin x, & x < 0, \\ 2x, & 0 \leq x \leq 2, \\ 1, & x > 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(1 + \frac{2}{3x + 1} \right)^{4 - 3x}. \end{aligned}$$

Вариант 14.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 - x - 6}{x^2 - 6x + 9} \text{ при } x_0 = 3, x_0 = -2, x_0 = \infty. \\ 2. \alpha(x) = \sin 3x - 3 \sin x, \beta(x) = x. \\ 3. \lim_{x \rightarrow 4} \frac{x - 4}{\sqrt{x - 2} - \sqrt{6 - x}}. \quad 4. \lim_{x \rightarrow 0} \frac{\cos 3x - \cos 7x}{\exp(9/x) - 1}. \\ 5. y = \begin{cases} x - 1, & x \leq 0, \\ x^2, & 0 < x < 2, \\ 2x, & x \geq 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{2x + 3}{2x - 1} \right)^{5x - 2}. \end{aligned}$$

Вариант 15.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 - 4x + 4}{x^2 - 4} \text{ при } x_0 = -3, x_0 = 2, x_0 = \infty. \\ 2. \alpha(x) = 2^{\sin 2x} - 1, \beta(x) = x. \\ 3. \lim_{x \rightarrow 6} \frac{\sqrt{x - 3} - \sqrt{9 - x}}{x - 6}. \quad 4. \lim_{x \rightarrow 0} \frac{1 - \cos 8x}{64x^2}. \end{aligned}$$

$$5. y = \begin{cases} x-1, & x < 1, \\ x^2+2, & 0 \leq x \leq 2, \\ -3x, & x > 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(1 - \frac{5}{7x+1} \right)^{3x+2}.$$

Вариант 16.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^3+8}{x^2+x-2} \text{ при } x_0 = 4, x_0 = -2, x_0 = \infty. \\ 2. \alpha(x) = \sin(\sqrt{x+9}-3), \beta(x) = x. \\ 3. \lim_{x \rightarrow 1} \frac{\sqrt{2-x}-1}{x^2-x}. \quad 4. \lim_{x \rightarrow 0} \frac{1-e^{-x}}{\sin x}. \\ 5. y = \begin{cases} x+2, & x \leq 0, \\ 2, & 0 < x \leq 2, \\ x^2-2, & x > 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{x+1}{x} \right)^{1-7x}. \end{aligned}$$

Вариант 17.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2-7x+10}{x^2-10x+25} \text{ при } x_0 = 3, x_0 = 5, x_0 = \infty. \\ 2. \alpha(x) = \operatorname{arctg}^7 2x, \beta(x) = x. \\ 3. \lim_{x \rightarrow 5} \frac{\sqrt{x}-\sqrt{10-x}}{x^2-25}. \quad 4. \lim_{x \rightarrow 0} \frac{\ln(1+3x)}{1-\cos 2x}. \\ 5. y = \begin{cases} x, & x \leq 0, \\ x^3, & 0 < x \leq 2, \\ x+3, & x > 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(1 - \frac{6}{x+3} \right)^{5x+2}. \end{aligned}$$

Вариант 18.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{(x-5)^2}{x^2-3x-10} \text{ при } x_0 = 5, x_0 = -1, x_0 = \infty. \\ 2. \alpha(x) = x + \sqrt[3]{\sin x}, \beta(x) = x. \\ 3. \lim_{x \rightarrow -3} \frac{x^2+5x+6}{\sqrt{x+7}-\sqrt{1-x}}. \quad 4. \lim_{x \rightarrow 0} \frac{x \cdot \operatorname{arctg} 3x}{1-\cos 2x}. \end{aligned}$$

$$5. y = \begin{cases} 2, & x < -2, \\ \sqrt{4-x^2}, & -2 \leq x < 2, \\ x-2, & x > 2. \end{cases} \quad 6. \lim_{x \rightarrow 2} (5-2x)^{\frac{x}{x-2}}.$$

Вариант 19.

$$1. \lim_{x \rightarrow x_0} \frac{4x^2 + x - 5}{(x-1)^2} \text{ при } x_0 = -2, x_0 = 1, x_0 = \infty.$$

$$2. \alpha(x) = \sqrt{9+x}, -3 \quad \beta(x) = x.$$

$$3. \lim_{x \rightarrow -5} \frac{\sqrt{4-x} - \sqrt{x+14}}{5-4x-x^2}.$$

$$4. \lim_{x \rightarrow 0} \frac{\exp(3x) - 1}{\operatorname{tg}(x/2)}.$$

$$5. y = \begin{cases} x, & x \leq -\pi, \\ \sin x, & -\pi < x < \pi/2, \\ 1, & x > \pi/2. \end{cases} \quad 6. \lim_{x \rightarrow 3} (7-2x)^{\frac{2}{x-3}}.$$

Вариант 20.

$$1. \lim_{x \rightarrow x_0} \frac{3x^2 - 5x - 2}{2x^2 - x - 6} \text{ при } x_0 = -2, x_0 = 2, x_0 = \infty.$$

$$2. \alpha(x) = \frac{\operatorname{arctg}(x^2 + 3x)}{\arcsin 2x}, \quad \beta(x) = x.$$

$$3. \lim_{x \rightarrow 2} \frac{\sqrt{3x-2} - \sqrt{6-x}}{x^3 - 8}.$$

$$4. \lim_{x \rightarrow 0} \frac{\operatorname{arctg} 3x}{\sin 9x}.$$

$$5. y = \begin{cases} 3x+4, & x < 0, \\ x^2-2, & -2 \leq x \leq 2, \\ x, & x \geq 2. \end{cases} \quad 6. \lim_{x \rightarrow -2} (5+2x)^{\frac{3}{x+2}}.$$

Вариант 21.

$$1. \lim_{x \rightarrow x_0} \frac{7x^2 - 12x + 5}{5x^2 - 2x - 3} \text{ при } x_0 = -1, x_0 = 1, x_0 = \infty.$$

$$2. \alpha(x) = 1 - \sqrt{1-x}, \quad \beta(x) = x.$$

$$3. \lim_{x \rightarrow 4} \frac{\sqrt{x-3} - \sqrt{5-x}}{x-4}.$$

$$4. \lim_{x \rightarrow 0} \frac{1 - \cos 5x}{x \cdot \sin 2x}.$$

$$5. y = \begin{cases} -x, & x \leq 0, \\ -(x-1)^2, & 0 < x < 2, \\ x-3, & x \geq 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{1+x}{x-3} \right)^{2x+4}.$$

Вариант 22.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{3x^2 - 2x - 8}{2x^2 - x - 6} \text{ при } x_0 = 2, x_0 = 3, x_0 = \infty. \\ 2. \alpha(x) = \ln(1 - 9\operatorname{tg}^4 x), \beta(x) = x. \\ 3. \lim_{x \rightarrow -1} \frac{\sqrt{2x+3} - 1}{\sqrt{5+x} - 2}. \quad 4. \lim_{x \rightarrow 0} \frac{2x^2 - 3x}{x \cdot (\exp(5x) - 1)}. \\ 5. y = \begin{cases} \cos x, & x \leq 0, \\ x^2 + 1, & 0 < x < 1, \\ x, & x \geq 1. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{2x-3}{2x+5} \right)^{2+x}. \end{aligned}$$

Вариант 23.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{4x^2 + 7x - 15}{x^2 - 4x - 21} \text{ при } x_0 = 2, x_0 = -3, x_0 = \infty. \\ 2. \alpha(x) = \operatorname{arctg}(\sqrt{9+x^8} - 3), \beta(x) = x. \\ 3. \lim_{x \rightarrow 6} \frac{\sqrt{x-5} - \sqrt{7-x}}{x-6}. \quad 4. \lim_{x \rightarrow 0} \frac{1 - \cos 5x}{x \cdot \operatorname{tg} 2x}. \\ 5. y = \begin{cases} -x, & x \leq 0, \\ x^2, & 0 < x \leq 2, \\ x+1, & x > 2. \end{cases} \quad 6. \lim_{x \rightarrow \infty} (4+3x)^{2/(x+1)}. \end{aligned}$$

Вариант 24.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{2x^2 + 5x - 3}{x^2 + 5x + 6} \text{ при } x_0 = -3, x_0 = 3, x_0 = \infty. \\ 2. \alpha(x) = \sqrt{\cos 9x} - 1, \beta(x) = x. \\ 3. \lim_{x \rightarrow 3} \frac{\sqrt{x-2} - \sqrt{4-x}}{x-3}. \quad 4. \lim_{x \rightarrow 0} \frac{\cos 3x - \cos x}{x^2}. \end{aligned}$$

$$5. y = \begin{cases} -x, & x \leq 0, \\ \sin x, & 0 < x \leq \pi, \\ x-2, & x > \pi. \end{cases} \quad 6. \lim_{x \rightarrow 2} (2x-3)^{\frac{x+2}{2-x}}.$$

Вариант 25.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 + 8x + 16}{2x^2 + x - 28} \text{ при } x_0 = 3, x_0 = -4, x_0 = \infty. \\ 2. \alpha(x) = 9^{2 \sin^5 x} - 1, \beta(x) = x. \\ 3. \lim_{x \rightarrow 5} \frac{\sqrt{1+3x} - \sqrt{2x+6}}{x^2 - 5x}. \quad 4. \lim_{x \rightarrow -2} \frac{\sin(x+2)}{x^3 + 8}. \\ 5. y = \begin{cases} -(x+1), & x \leq -1, \\ (x+1)^2, & -1 < x \leq 0, \\ x, & x > 0. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \left(\frac{x-1}{x+3} \right)^{2x-1}. \end{aligned}$$

Вариант 26.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 - 9}{3x^2 - 8x - 3} \text{ при } x_0 = 3, x_0 = -1, x_0 = \infty. \\ 2. \alpha(x) = \cos 7x - \cos x, \beta(x) = 2x^2. \\ 3. \lim_{x \rightarrow 5} \frac{\sqrt{2x-1} - \sqrt{x+4}}{x-5}. \quad 4. \lim_{x \rightarrow 0} \frac{\sin^2 5x}{1 - \cos 3x}. \\ 5. y = \begin{cases} -x^2, & x \leq 0, \\ \operatorname{tg} x, & 0 < x \leq \pi/4, \\ 2, & x > \pi/4. \end{cases} \quad 6. \lim_{x \rightarrow \infty} \frac{(3+2x)^{5/(x+1)}}{5}. \end{aligned}$$

Вариант 27.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{3x^2 - 2x - 8}{x^2 + 3x - 10} \text{ при } x_0 = -1, x_0 = 2, x_0 = \infty. \\ 2. \alpha(x) = \arcsin(x^2 - x), \beta(x) = x^3. \\ 3. \lim_{x \rightarrow 2} \frac{\sqrt{4-x} - \sqrt{5-2x}}{x^2 - 1}. \quad 4. \lim_{x \rightarrow 3} \frac{\sin(x-3)}{x^2 - 5x + 6}. \end{aligned}$$

$$5. y = \begin{cases} -2x, & x \leq 0, \\ x^2 + 1, & 0 < x \leq 1, \\ 2, & x > 1. \end{cases} \quad 6. \lim_{x \rightarrow \infty} (x+3) \ln \left(\frac{2x+1}{2x+3} \right).$$

Вариант 28.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 - 4x + 3}{2x^2 - 5x - 3} \text{ при } x_0 = -4, x_0 = 3, x_0 = \infty. \\ 2. \alpha(x) = \frac{\operatorname{tg}(x^2 + 2x)}{\arcsin x}, \beta(x) = x^2 + 2x. \\ 3. \lim_{x \rightarrow 3} \frac{\sqrt{6+x} - \sqrt{2x+3}}{x-3}. \quad 4. \lim_{x \rightarrow 0} \frac{\exp(3x) - 1}{x^3 + 27x}. \\ 5. y = \begin{cases} 3x + 4, & x < 0, \\ x^2 - 2, & -2 \leq x \leq 2, \\ x, & x \geq 2. \end{cases} \quad 6. \lim_{x \rightarrow 3} (4-x)^{\frac{1}{6-2x}}. \end{aligned}$$

Вариант 29.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{2x^2 - 7x + 3}{x^2 - 2x - 3} \text{ при } x_0 = 3, x_0 = 5, x_0 = \infty. \\ 2. \alpha(x) = \ln(1 + 4x), \beta(x) = x. \\ 3. \lim_{x \rightarrow 2} \frac{1 - \sqrt{x-2}}{2 - \sqrt{x+1}}. \quad 4. \lim_{x \rightarrow 4} \frac{x^3 - 64}{\operatorname{tg}(x-4)}. \\ 5. y = \begin{cases} -2x, & x \leq 0, \\ \sqrt{x}, & 0 < x < 4, \\ 1, & x \geq 4. \end{cases} \quad 6. \lim_{x \rightarrow \infty} (x+2) \ln \left(\frac{x+3}{x-1} \right). \end{aligned}$$

Вариант 30.

$$\begin{aligned} 1. \lim_{x \rightarrow x_0} \frac{x^2 - 7x + 6}{2x^2 - 15x + 18} \text{ при } x_0 = -1, x_0 = 6, x_0 = \infty. \\ 2. \alpha(x) = x^2 - \cos 2x, \beta(x) = 7x^2. \\ 3. \lim_{x \rightarrow 4} \frac{\sqrt{2x+1} - \sqrt{x+5}}{x-4}. \quad 4. \lim_{x \rightarrow -5} \frac{\operatorname{tg}(5+x)}{x^2 - 25}. \end{aligned}$$

$$5. \ y = \begin{cases} x+8, & x < -2, \\ x^2+2, & -2 \leq x \leq 1, \\ 2x, & x \geq 1. \end{cases}$$

$$6. \ \lim_{x \rightarrow 2} (3x-5)^{\frac{2x}{x^2-4}}.$$