08.06.
2020
(8:24.04)

№ 6.431

$$\lim_{x\to\infty} \frac{x+5x^2-x^3}{2x^3-x^2+7x} = \left[\frac{\infty}{\infty}\right] =$$

$$= \lim_{x\to\infty} \frac{x(1+5x-x^2)}{x(2x^2-x+7)} = \lim_{x\to\infty} \frac{1+5x-x^2}{2x^2-x+7} = \left[\frac{\infty}{\infty}\right] =$$

$$= \lim_{x\to\infty} \frac{x^2\left(\frac{1}{x^2}+\frac{5}{x}-1\right)}{x^3\left(2-\frac{1}{x}+\frac{7}{x^2}\right)} = \lim_{x\to\infty} \frac{\frac{1}{x^2}+\frac{5}{x}-1}{2-\frac{1}{x}+\frac{7}{x^2}} = \frac{0+0-1}{2-0+0} = \frac{1}{2}$$

№ 6.432

$$\lim_{x\to\infty} \frac{1-3x^2}{x^2+7x-2} = \left[\frac{\infty}{\infty}\right] = \lim_{x\to\infty} \frac{x^2\left(\frac{1}{x^2}-3\right)}{x^2\left(1+\frac{7}{x}-\frac{2}{x^2}\right)} =$$

$$\lim_{x\to\infty} \frac{\frac{1}{x^2}-3}{\ldots} = \frac{0-3}{1+0-0} = -3$$

№ 6.433

$$\lim_{x\to\infty} \frac{x^3+x}{x^4-3x^2+1} = \left[\frac{\infty}{\infty}\right]$$

1 сп.

$$\lim_{x\to\infty} \frac{x^4\left(\frac{1}{x}+\frac{1}{x^3}\right)}{x^4\left(1-\frac{3}{x^2}+\frac{1}{x^3}\right)} = \lim \frac{1/x+1/x^3}{1-3/x^2+1/x^3} = \frac{0+0}{1-0+0} = \frac{0}{1} = 0$$

2 сп.

$$\lim_{x\to\infty} \frac{x^3\left(1+\frac{1}{x^3}\right)}{x^3\left(x-\frac{3}{x}+\frac{1}{x^3}\right)} = \lim_{x\to\infty} \frac{\left(1+\frac{1}{x^3}\right)}{\left(x-\frac{3}{x}+\frac{1}{x^3}\right)} = \frac{1}{\infty} = 0$$

№ 6.4.34

$$\lim_{x\to\infty} \frac{x^5-2x}{2x^3+x^2+1} = \left[\frac{\infty}{\infty}\right] =$$

1 сп.

$$\lim_{x\to\infty} \frac{x^5\left(1-\frac{2}{x^4}\right)}{x^5\left(\frac{2}{x^2}+\frac{1}{x^3}+\frac{1}{x^5}\right)} = \frac{1-0}{0+0+0} = \frac{1}{0} = \infty$$

2 сп.

$$\lim_{x\to\infty} \frac{x^3\left(x^2-\frac{2}{x}\right)}{x^3\left(2+\frac{1}{x}+\frac{1}{x^3}\right)} = \lim_{x\to\infty} \frac{x^2-\frac{2}{x}}{2+\frac{1}{x}+\frac{1}{x^3}} = \frac{\infty}{2} = \infty$$

№ 6.4.35

$$\lim_{x\to+\infty} \left(\sqrt{x^2+4}-x\right) = [\infty-\infty] =$$

$$= \lim_{x\to+\infty} \frac{\left(\sqrt{x^2+4}-x\right)\left(\sqrt{x^2+4}+x\right)}{\sqrt{x^2+4}+x} = \lim_{x\to+\infty} \frac{x^2+4-x^2}{\sqrt{x^2+4}+x} =$$

$$= \frac{4}{\infty} = 0$$

№ 6.7.36

$$\lim_{x\to\infty}\left(\frac{x^3}{x^2-3}-x\right)=\left[\frac{\infty}{\infty}-\infty\right]=\lim_{x\to\infty}\left(\frac{x^3-x^3+3x}{x^2-3}\right)$$

$$\lim_{x\to\infty}\frac{3x}{x^2-3}$$

1 сп

$$\lim_{x\to\infty}\frac{3x}{x(x-\frac{3}{x})}=\lim_{x\to\infty}\frac{3}{x-\frac{3}{x}}=\frac{3}{\infty-0}=0$$

2 сп

$$\lim_{x\to\infty}\frac{x^2\cdot\frac{3}{x}}{x^2(1-\frac{3}{x^2})}=\lim_{x\to\infty}\frac{3/x}{1-3/x^2}=\frac{0}{1-0}=0$$

№ 6.4.37

① $\lim\limits_{x\to0} \frac{\sin \alpha x}{x}, \alpha \in R$

$\lim\limits_{x\to0} \frac{\sin \alpha x}{x} = \left[\frac{0}{0}\right] = \left[y = \alpha x \Rightarrow x\to0 \Rightarrow y\to0, \; x = y/\alpha \right] =$

$= \lim\limits_{y\to0} \frac{\sin y}{\frac{y}{\alpha}} = \lim\limits_{y\to0} \frac{\alpha \cdot \sin y}{y} =$

$= [\alpha \neq 0? \quad \alpha = 0 \quad \lim\limits_{x\to0} \frac{\sin(0\cdot x)}{0} = \lim\limits_{x\to0} \frac{0}{x}] =$

$= \alpha \cdot \lim\limits_{y\to0} \frac{\sin y}{y} = \left[\lim\limits_{x\to0} \frac{\sin x}{x} = 1 \atop 3.\ \Pi. \right] = \alpha \cdot 1 = \alpha$

② $\lim\limits_{x\to0} \frac{\sin 5x}{\sin 3x} = [x\to0, \text{ но } x\neq0] = \lim\limits_{x\to0} \frac{\frac{\sin 5x}{x}}{\frac{\sin 3x}{x}} =$

$= \frac{\lim\limits_{x\to0} \frac{\sin 5x}{x} \to \text{так же как в ①}}{\lim\limits_{x\to0} \frac{\sin 3x}{x} \to \text{так же как в ①}} = \frac{5}{3}$

т.к. нет. неопр

3) $\lim\limits_{x\to\frac{\pi}{2}} \frac{\cos x}{2x-\pi} = \left[\frac{\cos\frac{\pi}{2}}{\pi-\pi} = \frac{0}{0}\right] =$

$= \left[x \to \frac{\pi}{2} \Rightarrow x - \frac{\pi}{2} \to 0;\ y = x - \frac{\pi}{2},\ y \to 0 \quad x = y + \frac{\pi}{2} \right] =$

$= \lim\limits_{y\to 0} \frac{\cos\left(y+\frac{\pi}{2}\right)}{2\cdot\left(y+\frac{\pi}{2}\right)-\pi} = \frac{-\sin y}{2y+\pi-\pi} = \lim\limits_{y\to 0} \frac{-\sin y}{2y} = -\frac{1}{2}$

4) $\lim\limits_{x\to 0} \frac{\arcsin x}{x} = \left[t = \arcsin x \quad x = \sin t \quad x \to 0 \Rightarrow t = \arcsin x \to 0 \right] = \lim\limits_{t\to 0} \frac{t}{\sin t} =$

$= \frac{1}{\frac{\sin t}{t}} = \frac{1}{1} = 1$

Д/З

до 15.06. 2020

Черновик № 6.4.38 – 6.4.45
(разб. не получ)