Практикум 2

2) $$\lim_{x\to 0} \frac{\arcsin 5x}{\operatorname{arctg} 8x} = \left[\frac{0}{0}\right] = \lim_{x\to 0} \frac{5x}{8x} = \frac{5}{8}$$

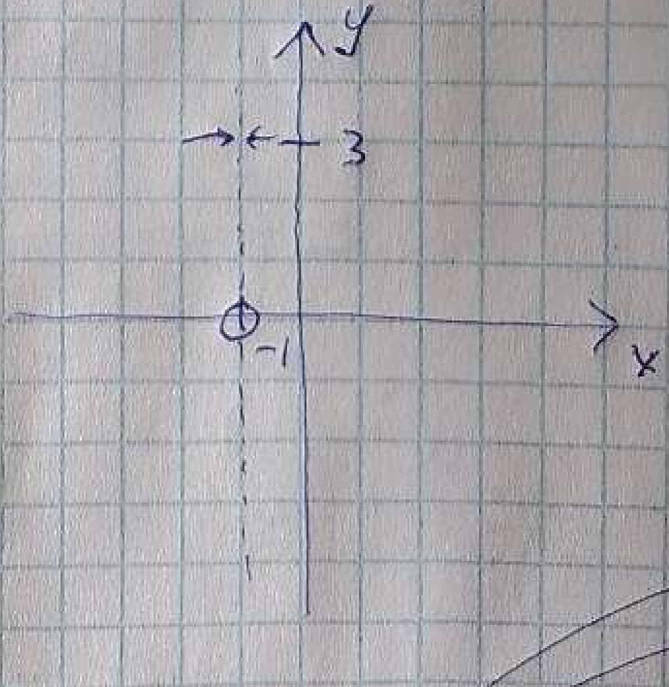
Практикум 3

$y=\frac{1+x^3}{1+x}$, точка разрыва $x_0=-1$

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

$$=\lim_{x\to-1^+}(x^2-x+1)=3 \Rightarrow -1 - \text{т.р. I рода,}$$

устранимая



$$f(x)=\begin{cases}3, & x=-1\\ \frac{1+x^3}{1+x}, & x\neq-1\end{cases}$$

Практикум 4

21) $y = 2t\sin t - (t^2-2)\cos t$

$y' = 2(\sin t + \cos t) - (2t\cos t - \sin t(t^2-2)) =$

$= 2\sin t + 2t\cos t - 2t\cos t + \sin t(t^2-2) =$

$= \sin t(2 + t^2 - 2) = \underline{\underline{t^2\sin t}}$

Практикум 5

12) $\begin{cases} x = \arccos \dfrac{1}{\sqrt{1+t^2}} \\ y = \arcsin \dfrac{1}{\sqrt{1+t^2}} \end{cases}$ $y'_x = ?$

$$y'_x = \frac{y'_t}{x'_t}$$

$$y'_t = \frac{1}{\sqrt{1-\frac{1}{1+t^2}}} \cdot \frac{1}{2\sqrt{1+t^2}} \cdot 2t = \frac{t}{\sqrt{1+t^2-1}} = \frac{t}{t} = 1$$

$$x'_t = -\frac{1}{\sqrt{1-\frac{1}{1+t^2}}} \cdot \frac{1}{2\sqrt{1+t^2}} \cdot 2t = -1$$

$$y'_x = \frac{1}{-1} = \underline{\underline{-1}}$$

Практикум 6

$y = \frac{2}{\sqrt{x}}$, $x_0 = 9$, $\Delta x = -0{,}01$, $dy = ?$

$dy = y'(x_0) \cdot \Delta x$

$y'(x) = 2\left(x^{-\frac{1}{2}}\right)' = 2 \cdot \left(-\frac{1}{2}\right) x^{-\frac{3}{2}} = -\frac{1}{\sqrt{x^3}}$

$dy = -\frac{1}{\sqrt{x_0^3}} \Delta x = -\frac{1}{\sqrt{243}} \cdot (-0{,}01) =$

$= \frac{0{,}01}{\sqrt{243}} \approx \frac{0{,}01}{15{,}59} \approx \underline{\underline{0{,}0006}}$

Практикум 7

$$\lim_{x\to 1}\frac{x^3-2x^2-x+2}{x^3-7x+6}=\left[\frac{0}{0}\right]=$$

$$=\lim_{x\to 1}\frac{3x^2-4x-1}{3x^2-7}=\frac{1}{2}$$

Практикум 8

$$y = \frac{x^3}{x^2+2x+3}$$

$$y' = \frac{3x^2(x^2+2x+3) - x^3(2x+2)}{(x^2+2x+3)^2} = 0$$

$$3x^4 + 6x^3 + 9x^2 - 2x^4 - 2x^3 = x^2(x^2+4x+9) = 0$$

$$x_1 = 0 \; ; \; x^2+4x+9 \neq 0$$

	$-$		$+$	y'
	$\searrow$	0	$\nearrow$	y

$\Rightarrow x_1 = 0$ - точка минимума

Практикум 9

$$y = \frac{1}{4}x^4 - \frac{2}{3}x^3 - \frac{3}{2}x^2 + 2, \quad x \in [-2; 4]$$

1) $y(-2) = \frac{1}{4}\cdot 16 + \frac{2}{3}\cdot 8 - \frac{3}{2}\cdot 4 + 2 = \frac{16}{3}$

$y(4) = \frac{1}{4}\cdot 256 - \frac{2}{3}\cdot 64 - \frac{3}{2}\cdot 16 + 2 = -\frac{2}{3}$

2) $y' = \frac{1}{4}\cdot 4x^3 - \frac{2}{3}\cdot 3x^2 - \frac{3}{2}\cdot 2x =$

$= x^3 - 2x^2 - 3x = x(x^2 - 2x - 3) = 0$

$x_1 = 0$ $\qquad$ $x^2 - 2x - 3 = 0$

$D = 4 + 12 = 16$

$x_{2,3} = \frac{2 \pm 4}{2} = \left[\begin{array}{l} x_2 = 3 \\ x_3 = -1 \end{array}\right.$

$y(0) = 2$

$y(3) = \frac{1}{4}\cdot 81 - \frac{2}{3}\cdot 27 - \frac{3}{2}\cdot 9 + 2 = -\frac{37}{4}$

$y(-1) = \frac{1}{4} + \frac{2}{3} - \frac{3}{2} + 2 = \frac{17}{12}$

Наименьшее знач.: $y = \frac{16}{3}$

Наибольшее знач.: $y = -\frac{37}{4}$