№1

$$f(x) = \frac{23x^2 + \cos(x)}{242x^2 - 726}$$

1) Parna / Neparna funkcia

$$f(-x) = \frac{23(-x^2) + \cos(x)}{242(-x^2) - 726}$$

$$f(-x) = \frac{23x^2 + \cos(x)}{242x^2 - 726}$$

$f(-x) = f(x)$ – funkcia je parna

2) Odbor funkcii

$242x^2 - 726 = 0 \quad |:242$

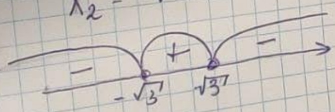
$x^2 - 3 = 0$

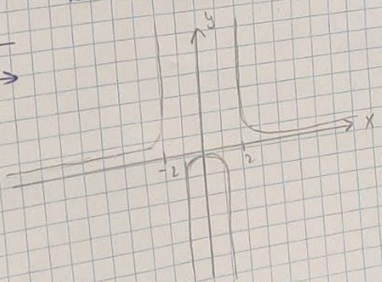
$x^2 = 3$

$x_1 = -\sqrt{3}$

$x_2 = -\sqrt{3}$

$D(f) = /\{-\sqrt{3}, \sqrt{3}\}$





3

4

$$f(x) = \sin(2x^7) + \cos(\sin(x)) + \sin(x^7) \cdot \cos(x^2)$$

1) Derivácia

$$f'(x) = (\sin(2x^7))' + (\cos(\sin(x)))' + (\sin(x^7) \cdot \cos(x^2))'$$

$$f'(x) = \cos(2x^7) \cdot 2 \cdot 7x^6 - \sin(\sin(x)) \cdot \cos(x) + \cos(x^7) \cdot 7x^6 \cdot \cos(x^2) + \sin(x^7) \cdot (-\sin(x^2) \times$$
$$\times 2 \cdot x)$$

$$f'(x) = 14x^6 \cdot \cos(2x^7) \cdot \sin(\sin(x)) \cdot \cos(x) + 7x^6 \cdot \cos(x^7) \cdot \cos(x^2) - 2x \cdot \sin(x^7) \cdot \sin(x^2)$$

2) Rovnica dotyčnej

$$y_k = y_0 + y'(x_0)(x - x_0), \quad x_0 = \frac{\pi}{2}$$

$$y_0 = \sin\left(\frac{\pi^7}{64}\right) + \cos(1) + \sin\left(\frac{\pi^7}{128}\right) \cdot \cos\left(\frac{\pi^2}{4}\right)$$

$$f'\left(\frac{\pi}{2}\right) = 7 \cdot \left(\frac{\pi}{2}\right)^6 \cdot \cos\left(\left(\frac{\pi}{2}\right)^2\right) \cdot \cos\left(\left(\frac{\pi}{2}\right)^7\right) + 14 \cdot \left(\frac{\pi}{2}\right)^6 \cdot \cos\left(2 \cdot \left(\frac{\pi}{2}\right)^7\right) - 2 \cdot \frac{\pi}{2} \cdot \sin\left(\left(\frac{\pi}{2}\right)^2\right) \times$$
$$\times \sin\left(\left(\frac{\pi}{2}\right)^7\right) \cdot \sin\left(\sin\left(\frac{\pi}{2}\right)\right) \cdot \cos\left(\frac{\pi}{2}\right) = \frac{17 \cdot \pi^6 \cdot \cos\left(\frac{\pi^7}{64}\right)}{32} + \frac{17 \cdot \pi^6 \cdot \cos\frac{\pi^2}{4} \times \cos\frac{\pi^7}{128}}{64} - \pi \cdot \sin\left(\frac{\pi^2}{4}\right) \cdot \sin\left(\frac{\pi^7}{128}\right) \Rightarrow$$

$$\Rightarrow y_k = \sin\frac{\pi^7}{64} + \cos(1) + \sin\frac{\pi^7}{128} \cdot \cos\frac{\pi^2}{4} + \frac{7 \cdot \pi^6 \cdot \cos\frac{\pi^7}{64}}{32} +$$
$$+ \frac{7 \cdot \pi^6 \cdot \cos\frac{\pi^2}{4} \cdot \cos\frac{\pi^7}{128}}{64} - \pi \cdot \sin\left(\frac{\pi^2}{4}\right) \cdot \sin\frac{\pi^7}{128} \cdot \left(x - \frac{\pi}{2}\right)$$

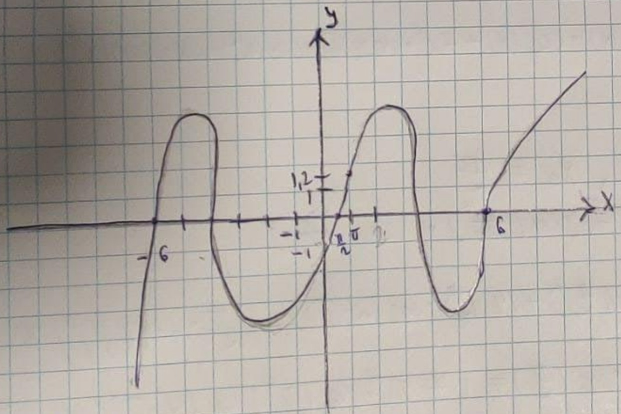
③ Rovnica normály

$$y_n = y_0 - \frac{1}{y'(x_0)} \cdot (x - x_0)$$

$$y_n = \sin\left(\frac{\pi^7}{64}\right) + \cos(1) + \sin\left(\frac{\pi^7}{128}\right) \cdot \cos\left(\frac{\pi^2}{4}\right) -$$

$$- \frac{1}{\frac{7 \cdot \pi^6 \cdot \cos \frac{\pi^7}{64}}{32} + \frac{7 \cdot \pi^6 \cdot \cos \frac{\pi^2}{4} \cdot \cos\left(\frac{\pi^7}{128}\right)}{64} - \pi \cdot \sin\left(\frac{\pi^2}{4}\right) \cdot \sin\left(\frac{\pi^7}{128}\right)}$$

$$x \left(x - \frac{\pi}{2}\right)$$



$A\left[\frac{\pi}{2}, 1{,}2\right]$

Derivácia

(2) $f(x) = \ln(x^3-1)\cdot\sin(x) + x^5\cdot e^{3x-2} + e^{7x}\cdot e^{\ln(x)}$

$f'(x) = (\ln(x^3-1)\cdot\sin(x))' + (x^5\cdot e^{3x-2})' + (e^{7x}\cdot e^{\ln x})'$

$f'(x) = (\ln(x^3-1))'\cdot\sin(x) + \ln(x^3-1)\cdot(\sin x)' + (x^5\cdot e^{3x-2})' + (e^{7x}\cdot e^{\ln x})'$

$f'(x) = \frac{3x^2}{x^3-1}\cdot\sin(x) + \ln(x^3-1)\cdot\cos(x) + (x^5\cdot e^{3x-2})' + (e^{7x}\cdot e^{\ln x})'$

$f'(x) = \frac{3x^2\cdot\sin(x)}{x^3-1} + \ln(x^3-1)\cdot\cos(x) + (x^5)'\cdot(e^{3x-2}) + (x^5)(e^{3x-2})' + (e^{7x}\cdot e^{\ln x})'$

$f'(x) = \frac{3x^2\cdot\sin x}{x^3-1} + \ln(x^3-1)\cdot\cos(x) + 5x^4\cdot e^{3x-2} + x^5\cdot e^{3x-2}\cdot 3 + (e^{7x}\cdot \underbrace{e^{\ln x}}_{=x})'$

$f'(x) = \frac{3x^2\cdot\sin x}{x^3-1} + \ln(x^3-1)\cdot\cos x + 5x^4\cdot e^{3x-2} + x^5\cdot e^{3x-2}\cdot 3 + (e^{7x}\cdot x)'$

$f'(x) = \frac{3x^2\cdot\sin x}{x^3-1} + \ln(x^3-1)\cdot\cos x + 5x^4\cdot e^{3x-2} + x^5\cdot e^{3x-2}\cdot 3 + e^{7x} + x\cdot e^{7x}\cdot 7$