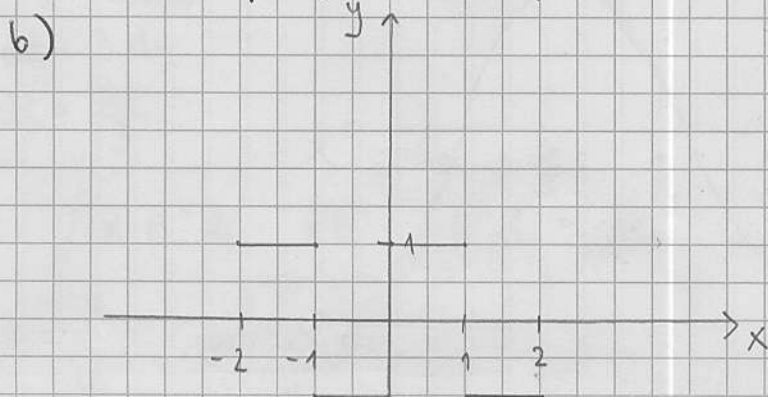


## Naloga 1

- a) Funkcija narašča pri  $x \in [-2, -1] \cup [0, 1]$ .  
Funkcija pada pri  $x \in [-1, 0] \cup [1, 2]$ .  
Funkcija je soda, saj je simetrična glede na y-os.



Točke nezveznosti:

$$x_1 = -1$$

$$x_2 = 0$$

$$x_3 = 1$$

## Naloga 2

a)  $P = P_0 e^{kt}$

~~$P = P_0 e^{kt}$~~

$$2P_0 = P_0 e^{kt}$$

$$2 = e^{kt}$$

~~logaritmiramo~~

~~$\ln 2$~~

$$2 = e^{\frac{3}{100}t} \quad / \text{logaritmiramo}$$

$$\ln 2 = \frac{3}{100} \cdot t$$

$$0.69 = \frac{3}{100} \cdot t$$

$$t = 23 \text{ let}$$

b)  $P = P_0 e^{kt}$      $P = P_0 (1+r)^t$

$$P_0 e^{kt} = P_0 (1+r)^t$$

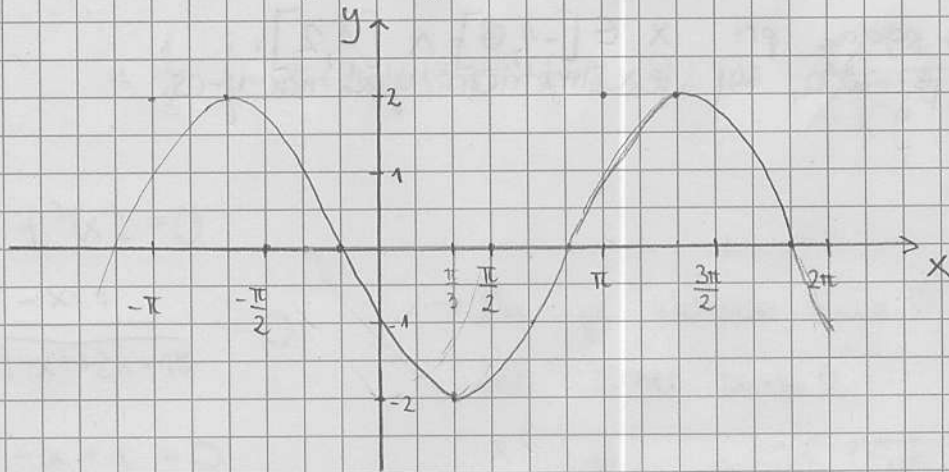
$$e^{kt} = (1+r)^t \quad / \sqrt[t]{\quad}$$

$$e^k = 1+r \quad / \text{logaritmiramo}$$

$$k = \ln(1+r)$$

### Naloga 3

a)  $f(t) = -2 \cos\left(t - \frac{\pi}{3}\right)$



b)  $f(t) = -1$   $[0, 2\pi]$

$$-2 \cos\left(t - \frac{\pi}{3}\right) = -1$$

$$\cos\left(t - \frac{\pi}{3}\right) = \frac{1}{2} \rightarrow \text{kje ima cos vrednost } \frac{1}{2} ? \rightarrow \text{Namigi } \text{😊}!$$

i)  $t - \frac{\pi}{3} = \frac{1}{3} \frac{\pi}{3} + 2k\pi, k \in \mathbb{Z}$  ii)  $t - \frac{\pi}{3} = \frac{5\pi}{3} + 2k \cdot \pi$

$$t_1 = \frac{2\pi}{3} + 2k \cdot \pi, k \in \mathbb{Z}$$

$$t_2 = 2\pi + 2k \cdot \pi, k \in \mathbb{Z}$$

### Naloga 4

a)  $y = \frac{5x-1}{x+1} \Rightarrow y' = \frac{5(x+1) - (5x-1)}{(x+1)^2} = \frac{5x+5-5x+1}{(x+1)^2} = \frac{6}{(x+1)^2} \cdot dx$

b)  $y = e^{(2x-1)^2} \Rightarrow y' = e^{(2x-1)^2} \cdot 2(2x-1) \cdot 2 = (8x-4) \cdot e^{(2x-1)^2} \cdot dx$

~~\*1/2(2x-1)~~

# Naloga 5

a)  $f(x) = (x-1)^3 (x+3)^2$

$$f'(x) = \cancel{3(x-1)^2} \cdot \cancel{2(x+3)} + 3(x-1)^2 (x+3)^2 + 2(x-1)^3 (x+3)$$

$$f'(x) = 0$$

$$3(x-1)^2 (x+3)^2 + 2(x-1)^3 (x+3) = 0$$

$$(x-1)^2 (x+3) (3(x+3) + 2(x-1)) = 0$$

$$(x-1)^2 (x+3) (5x+7) = 0$$

$$x_{1,2} = 1 \quad T_{1,2} (1, 0)$$

$$x_3 = -3 \quad T_3 (-3, 0)$$

$$x_4 = -\frac{7}{5} \quad T_4 \left(-\frac{7}{5}, -\frac{110592}{3425}\right) \quad y = \left(-\frac{7}{5} - 1\right)^3 \left(-\frac{7}{5} + 3\right)^2 = -\frac{110592}{3425}$$

$$f''(x) = 2(x-1)(x+3)(5x+7) + (x-1)^2 (5x+7) + 5(x-1)^2 (x+3)$$

$$f''(1) = 0 \rightarrow T_{1,2} \text{ je } \text{prevojna točka.}$$

$$f''(-3) = (-3-1)^2 (5 \cdot (-3) + 7) = 16 \cdot (-8) = -128 < 0 \rightarrow T_3 \text{ je maksimum.}$$

$$f''\left(-\frac{7}{5}\right) = 5\left(-\frac{7}{5} - 1\right)^2 \left(-\frac{7}{5} + 3\right) = 46,08 > 0 \rightarrow T_4 \text{ je minimum.}$$

b)  $f(x) = (x-4)^4 (x+3)^3$

$$f'(x) = 4(x-4)^3 (x+3)^3 + (x-4)^4 \cdot 3(x+3)^2 = \\ = (x-4)^3 (x+3)^2 (4(x+3) + 3(x-4)) = \\ = 7x(x-4)^3 (x+3)^2$$

$$f'(x) = 0$$

$$7x(x-4)^3 (x+3)^2 = 0$$

$$x_1 = 0 \quad T_1 (0, 6192)$$

$$x_{2,3,4} = 4 \quad T_{2,3,4} (4, 0)$$

$$x_{5,6} = -3 \quad T_{5,6} (-3, 0)$$

$$f'(-3, 1) = -77,6 < 0$$

$$f'(-2, 9) = 66 > 0$$

$$f''(x) = 7(x-4)^3 (x+3)^2 + 21x(x-4)^2 (x+3)^2 + \\ 14x(x-4)^3 (x+3)$$

$$f''(0) = 7(-4)^3 (3^2) + 0 = -4032 < 0 \rightarrow T_1 \text{ je maksimum}$$

$$f''(4, 1) = 1,44 > 0 \quad \left. \begin{array}{l} f''(3, 9) = -1,29 < 0 \\ f''(4, 1) = 1,44 > 0 \end{array} \right\} T_{2,3,4} \text{ je minimum}$$

$$f''(4) = 0 \rightarrow T_{2,3,4} \text{ je prevoj?}$$

$$f''(-3) = 0 \rightarrow T_{5,6} \text{ je prevoj?}$$

$$c) f(x) = \sqrt{16 - (x-1)^2} = (16 - (x-1)^2)^{\frac{1}{2}} = (-x^2 + 2x + 15)^{\frac{1}{2}}$$

$$f'(x) = \frac{1}{2} (16 - (x-1)^2)^{-\frac{1}{2}} = \frac{1}{2} (-x^2 + 2x + 15)^{-\frac{1}{2}} \cdot (-2x + 2) = \frac{-x + 1}{\sqrt{-x^2 + 2x + 15}}$$

$$f'(x) = 0$$

$$\frac{-x+1}{\sqrt{-x^2+2x+15}} = 0$$

→ Pa je ulomek enak 0, mora biti števec enak 0.

$$\begin{aligned} -x+1 &= 0 \\ -x &= -1 \\ x &= 1 \end{aligned}$$

T(1, 4)

$$f''(x) = \frac{-\sqrt{-x^2+2x+15} - (-x+1) \cdot \frac{-x+1}{\sqrt{-x^2+2x+15}}}{-x^2+2x+15}$$

$$f''(1) = -\frac{4}{16} < 0 \rightarrow \text{Točka T je maksimum.}$$

### Naloga 6

x	y
1	1
2	-1
3	-2
4	0

$$SX = 1 + 2 + 3 + 4 = 10$$

$$SY = 1 - 1 - 2 + 0 = -2$$

$$SXY = 1 \cdot 1 + 2(-1) + 3(-2) + 4 \cdot 0 = 1 - 2 - 6 = -7$$

$$SXX = 1^2 + 2^2 + 3^2 + 4^2 = 1 + 4 + 9 + 16 = 30$$

$$a = \frac{SXY - \frac{1}{N} \cdot SX \cdot SY}{SXX - \frac{1}{N} \cdot SX \cdot SX} = \frac{-7 - \frac{1}{4} \cdot 10 \cdot (-2)}{30 - \frac{1}{4} \cdot 100} = \frac{-2}{5}$$

$$\bar{x} = \frac{1}{4} \cdot 10 = \frac{5}{2}$$

$$\bar{y} = \frac{1}{4} \cdot (-2) = -\frac{1}{2}$$

$$b = \bar{y} - a\bar{x} = -\frac{1}{2} - \left(-\frac{2}{5}\right) \cdot \left(\frac{5}{2}\right) = -\frac{1}{2} + 1 = \frac{1}{2}$$

$$f(x) = -\frac{2}{5}x + \frac{1}{2}$$

## Naloga 7

$$a) \int \frac{dx}{3x-2} = \int \frac{\frac{dt}{3}}{t} = \frac{1}{3} \int \frac{dt}{t} = \frac{1}{3} \ln |3x-2| + C$$

$$t = 3x-2$$

$$dt = 3 dx$$

$$dx = \frac{dt}{3}$$

$$b) \int x \cdot e^x dx = x e^x - \int e^x dx = x e^x - e^x + C$$

$$u = x \quad dv = e^x dx$$

$$du = dx$$

$$v = e^x$$

$$\textcircled{*} \int u dv = uv - \int v du$$

## Naloga 8

$$f(x) = \sqrt{x}$$

interval  $[0, 1]$

$$g(x) = 2-x$$

$$\begin{aligned} \text{pl} &= \int_0^1 (2-x-\sqrt{x}) dx = 2x - \frac{x^2}{2} - \frac{2x^{\frac{3}{2}}}{\frac{3}{2}} \Big|_0^1 = \\ &= 2 \cdot 1 - \frac{1}{2} - \frac{2}{3} = \underline{\underline{\frac{5}{6}}} \end{aligned}$$

## Naloga 9

$$f(x) = 4-x^2$$

$[-2, 2]$

$$n=2$$

$$\frac{b-a}{n} \sum_{k=0}^{n-1} f\left(\frac{x_k + x_{k+1}}{2}\right) = \frac{4-0}{2} [f(-1) + f(1)] =$$

$$= 2 \cdot (4-1 + 4-1) = 2 \cdot 6 = \underline{\underline{12}} \quad \text{Razlika je } \frac{1}{3}$$

$$n=4$$

$$\frac{4-0}{4} f\left(-\frac{3}{2}\right) + f\left(-\frac{1}{2}\right) + f\left(\frac{1}{2}\right) + f\left(\frac{3}{2}\right) =$$

$$= 4 - \frac{9}{4} + 4 - \frac{1}{4} + 4 - \frac{1}{4} + 4 - \frac{9}{4} = \underline{\underline{11}} \quad \text{Razlika je } \frac{1}{3}$$

$$\int_{-2}^2 (4-x^2) dx = 4x - \frac{x^3}{3} \Big|_{-2}^2 = 8 - \frac{8}{3} + 8 - \frac{8}{3} = \underline{\underline{\frac{10}{3}}} \quad \text{- Točen rezultat.}$$