ODVODI

$f(x) = x^n \qquad f'(x) = n \cdot x^{n-1}$

$f(x) = x^5 \qquad f'(x) = 5 \cdot x^4$

$f(x) = x^{20} \qquad f'(x) = 20x^{19}$

$f(x) = x^{10} + x^7 \qquad f'(x) = 10x^9 + 7x^6$

$f(x) = x^{15} + x^{10} + x^8 + x^2$

$f'(x) = 15x^{14} + 10x^9 + 8x^7 + 2x$

$f(x) = x^1 \qquad f'(x) = 1x^0 = 1 \cdot 1 = 1 \qquad f(x) = x \quad f'(x) = 1$

$f(x) = x^{10} + x^3 + x^2 + x \qquad f'(x) = 10x^9 + 3x^2 + 2x + 1$

$f(x) = x^{-3} \qquad f'(x) = -3x^{-4}$

konstanta

$f(x) = k \qquad f'(x) = 0$

$f(x) = 15 \qquad f'(x) = 0 \qquad f(x) = \frac{3}{4} \quad f'(x) = 0$

$f(x) = -20 \qquad f'(x) = 0 \qquad f(x) = 3^{-5} \quad f'(x) = 0$

$f(x) = x^3 - x^2 + x - 15$

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

$f(x) = k x^n \qquad f'(x) = k \cdot n \cdot x^{n-1}$

$f(x) = 3x^5 \qquad f'(x) = 3 \cdot 5x^4 = 15x^4$

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

$f'(x) = 2 \cdot 4x^3 - 7 \cdot 3x^2 + 4 \cdot 2x + 2 \cdot 1 + 0$

$f'(x) = 8x^3 - 21x^2 + 8x + 2$

$$(f \cdot g)' = f' \cdot g + f \cdot g'$$

$$f(x) = \overbrace{(x+2)}^{f} \cdot \overbrace{(x^2+3x)}^{g}$$

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

$$f'(x) = (1+0) \cdot (x^2+3x) + (x+2) \cdot (2x+3 \cdot 1)$$

$$f'(x) = 1 \cdot (x^2+3x) + (x+2)(2x+3)$$

$$f'(x) = x^2 + 3x + 2x^2 + 3x + 4x + 6$$

$$f'(x) = 3x^2 + 10x + 6$$

$$f(x) = \overbrace{(2x^3-x)}^{f} \cdot \overbrace{(3x^2-7)}^{g}$$

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

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

$$f'(x) = (6x^2-1)(3x^2-7) + (2x^3-x) \cdot 6x$$

$$f'(x) = 18x^4 - 42x^2 - 3x^2 + 7 + 12x^4 - 6x^2$$

$$f'(x) = 30x^4 - 51x^2 + 7$$

$$\left(\frac{f}{g}\right)' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$$f(x) = \frac{\overbrace{x^2+2}^{f}}{\underbrace{x+3}_{g}}$$

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

$$f'(x) = \frac{(2x+0) \cdot (x+3) - (x^2+2) \cdot 1}{(x+3)^2} = \frac{2x \cdot (x+3) - (x^2+2) \cdot 1}{(x+3)^2}$$

$$f'(x) = \frac{2x^2 + 6x - x^2 - 2}{(x+3)^2} = \frac{x^2 + 6x - 2}{(x+3)^2}$$

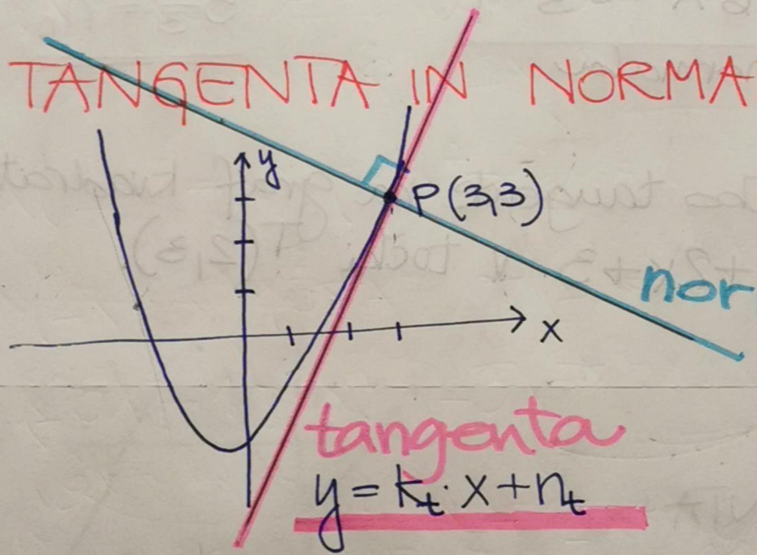
$$f(x) = \frac{\boxed{3x+3}\ f}{\boxed{x^2}\ g}$$

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

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

$$f'(x) = \frac{3x^2 - 6x^2 - 6x}{x^4} = \frac{-3x^2 - 6x}{x^4}$$

TANGENTA IN NORMALA



$y = k_n \cdot x + n_n$

$y = k_t \cdot x + n_t$

Premica: $y = kx + n$
Lin. f.
smerni koef.
zač. vrednost

Dana je funkcija $f(x) = x^2 + 2x - 3$.
Zapiši enačbo tangente in normale na krivuljo v točki $T(2, y_0)$

(1.) TOČKA $T(2, y_0)$

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

$y = 2^2 + 2 \cdot 2 - 3$

$y = 4 + 4 - 3$

$y = 5$

$T(2, 5)$

(2.) TANGENTA

$y = k_t \cdot x + n_t$

– SMERNI KOEFICIENT

$k_t = f'(x)$

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

$f'(x) = 2x + 2 \cdot 1$

$f'(x) = 2x + 2$

$f'(2) = 2 \cdot 2 + 2$

$f'(2) = 6 = k_t$

– ZAČ. VREDNOST

$y = k_t \cdot x + n_t$

$5 = 6 \cdot 2 + n_t$

$5 = 12 + n_t$

$5 - 12 = n_t$

$-7 = n_t$

$\boxed{y = 6x - 7}$

3. NORMALA

$y = k_n \cdot x + n_n$

$T(2,5)$

smerni koeficient

$\boxed{k_n = -\frac{1}{k_t}}$

$k_n = -\frac{1}{6}$

$\boxed{y = -\frac{1}{6}x + 5\frac{1}{3}}$

normala

začetna vrednost

$y = k_n \cdot x + n_n$

$5 = -\frac{1}{6} \cdot 2 + n_n$

$5 = -\frac{1}{3} + n_n$

$5 + \frac{1}{3} = n_n$

$5\frac{1}{3} = n_n$

Zapiši enačbo tangente na graf kvadratne funkcije $f(x) = -x^2 + 2x + 3$ v točki $T(2,3)$.

1. TOČKA

$T(2,3)$

2. TANGENTA

$y = k_t \cdot x + n_t$

smerni koeficient

$k_t = f'(x)$

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

$f'(x) = -2x + 2 \cdot 1$

$f'(x) = -2x + 2$

$f'(2) = -2 \cdot 2 + 2$

$f'(2) = -4 + 2$

$f'(2) = -2$

$\boxed{k_t = -2}$

začetna vrednost

$y = k_t \cdot x + n_t$

$3 = -2 \cdot 2 + n_t$

$3 = -4 + n_t$

$3 + 4 = n_t$

$\boxed{7 = n_t}$

$\boxed{y = -2x + 7}$

Zapiši enačbo tangente na krivuljo $f(x)=x^2-2x-3$ v točki $D(4, y_0)$.

① TOČKA $D(4, y_0)$

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

$f(4)=4^2-2\cdot4-3$

$f(4)=16-8-3$

$f(4)=5$

$D(4,5)$

$$\boxed{y=6x-19}$$

② TANGENTA

$y=k_t\cdot x+n_t$

sm. koef.

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

$f'(x)=2x-2\cdot1$

$f'(x)=2x-2$

$f'(4)=2\cdot4-2$

$f'(4)=6$

$\boxed{k_t=6}$

toč. nad.

$y=k_t\cdot x+n_t$

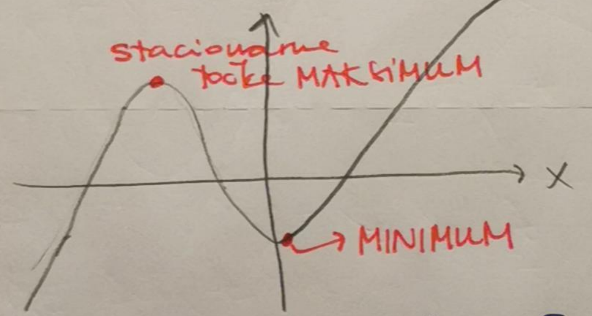
$5=6\cdot4+n_t$

$5=24+n_t$

$5-24=n_t$

$\boxed{-19=n_t}$

STACIONARNE TOČKE - EKSTREMI FUNKCIJE



Izračunaj stacionarne točke funkcije

$f(x)=2x^2+5x-9$

① ODVOD FUNKCIJE

$f(x)=2x^2+5x-9$

$f'(x)=2\cdot2x+5\cdot1$

$f'(x)=4x+5$

$T\left(-\frac{5}{4}, y\right)$

$$\boxed{T\left(-\frac{5}{4}, -\frac{97}{8}\right)}$$

② ODVOD IZENAČI Z 0

$4x+5=0$

$4x=-5 \quad /:4$

$x=-\frac{5}{4}$

③ V OSNOVNO FUNKCIJO VSTAVI X

$f(x)=2x^2+5x-9$

$f\left(-\frac{5}{4}\right)=2\cdot\left(-\frac{5}{4}\right)^2+5\cdot\left(-\frac{5}{4}\right)-9$

$=\cancel{2}^{1}\cdot\frac{25}{\cancel{16}_{8}}-\frac{25}{4}-9$

$=\frac{25\cdot1}{8\cdot1}-\frac{25\cdot2}{4\cdot2}-\frac{9\cdot8}{1\cdot8}=\frac{25-50-72}{8}=$

$y=-\frac{97}{8}$

Poišči stacionarne točke funkcije $f(x) = 6 - 2x - x^2$.

1. ODVOD

$f(x) = 6 - 2x - x^2$

$f'(x) = -2 \cdot 1 - 2x$

$\underline{f'(x) = -2 - 2x}$

$T(-1, y)$

$\boxed{T(-1, 7)}$

2. $-2 - 2x = 0$

$-2x = 2 \quad / : (-2)$

$\underline{x = -1}$

3. $f(x) = 6 - 2x - x^2$

$f(-1) = 6 - 2 \cdot (-1) - (-1)^2$

$f(-1) = 6 + 2 - 1$

$f(-1) = 7$