

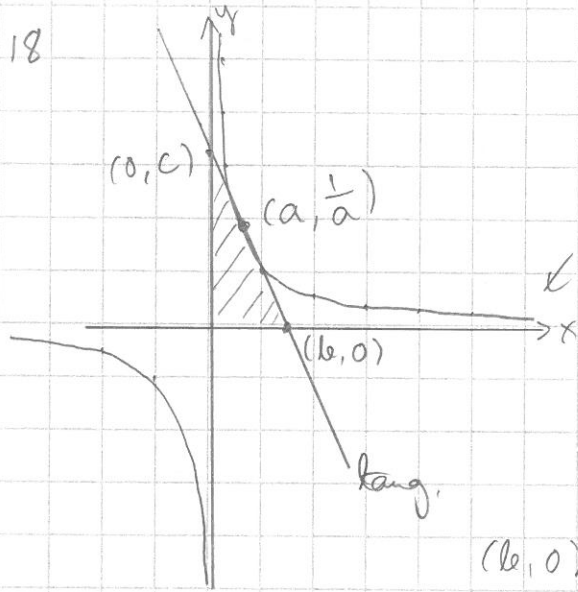
$$g'(x) = \frac{3x^2(x^2+5) - x^3 \cdot 2x}{(x^2+5)^2} = \frac{3x^4 + 15x^2 - 2x^4}{(x^2+5)^2}$$

$$= \frac{\overset{\geq 0}{x^4} + \overset{\geq 0}{15x^2}}{\underbrace{(x^2+5)^2}_{> 0}} \geq 0$$

jö lisäen $g'(x) = 0 \Leftrightarrow x = 0$ (terossaikha)

$\Rightarrow g$ on aidosti kasvava \mathbb{R} :ssä \Rightarrow väite m.o.t.

11.18



$$y' = \frac{0 \cdot x - 1 \cdot 1}{x^2} = -\frac{1}{x^2}$$

$$k_t = y'(a) = -\frac{1}{a^2}$$

┌ piste: (x_0, y_0) , kulmal.: k

└ yhtälö: $y - y_0 = k(x - x_0)$

$$\text{tangentti: } y - \frac{1}{a} = -\frac{1}{a^2}(x - a)$$

$$(b, 0): 0 - \frac{1}{a} = -\frac{1}{a^2}(b - a) \quad | \cdot (-a^2)$$

$$\Leftrightarrow a = b - a \quad \Leftrightarrow b = 2a$$

$$(0, c): c - \frac{1}{a} = -\frac{1}{a^2}(0 - a) \quad \Leftrightarrow c = \frac{1}{a} + \frac{1}{a} = \frac{2}{a}$$

Kolmion pinta-ala:

$$A = \frac{1}{2} |b| |c| = \frac{1}{2} |bc| = \frac{1}{2} |2a \cdot \frac{2}{a}| = \frac{1}{2} |4| = \frac{1}{2} \cdot 4 = 2$$

(vakio)

\Rightarrow väite m.o.t.

QED

□

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12. Rationaalifunktion ääriarvot

12.2 $f(x) = \frac{3x^2 - 9}{x + 2}$ f jalk. jö derivo, kun $x \neq -2$

$$f'(x) = \frac{6x \cdot (x+2) - (3x^2 - 9) \cdot 1}{(x+2)^2} = \frac{6x^2 + 12x - 3x^2 + 9}{(x+2)^2} = \frac{3x^2 + 12x + 9}{(x+2)^2} = 0$$