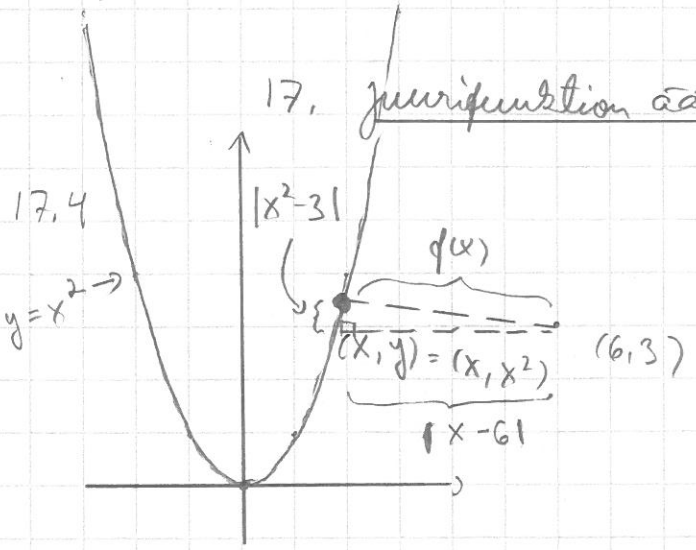
$$= \underbrace{1^{\frac{1}{3}}}_{=1} - \frac{2}{3} \cdot \underbrace{1^{-\frac{2}{3}}}_{=1} \cdot (-4) = 1 + \frac{8}{3} = \frac{11}{3}$$

tangentti: $y - (-2) = \frac{11}{3}(x - (-2)) \Leftrightarrow y = \frac{11}{3}x + \frac{16}{3}$

17. Juurifunktion ääriarvot

17.4



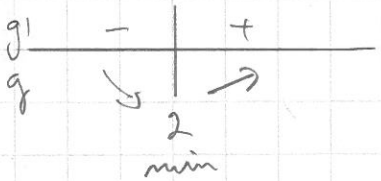
Jonan pituus:

$$f(x) = \sqrt{\underbrace{(x-6)^2 + (x^2-3)^2}_{=g(x)}}$$

$\sqrt{x}$ on aidosti kasvava $\Rightarrow f(x)$ on pienin kun $g(x)$ on pienin

g on jatkuva ja derivoituva $\mathbb{R}$:ssä

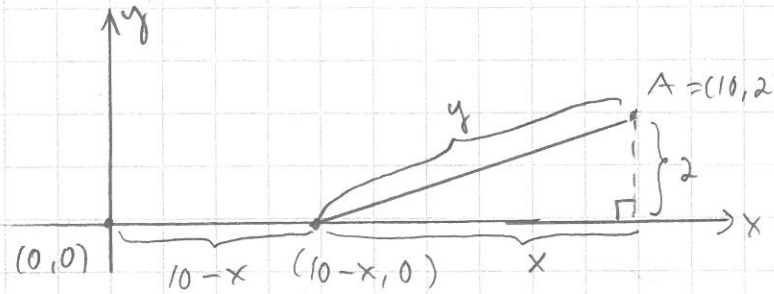
$$g'(x) = 2(x-6)^1 \cdot 1 + 2(x^2-3)^1 \cdot 2x = 0$$
$$\Leftrightarrow 2x - 12 + 4x^3 - 12x = 0$$
$$\Leftrightarrow 4x^3 - 10x - 12 = 0$$
$$\Leftrightarrow 2(x-2)(2x^2+4x+3) = 0 \quad \text{(kerrotaan)}$$
$$\Leftrightarrow x - 2 = 0 \text{ tai } 2x^2+4x+3 = 0$$
$$D = 4^2 - 4 \cdot 2 \cdot 3 = 16 - 24 = -8 < 0 \text{ ei reaal.}$$
$$\Leftrightarrow x = 2$$



$g'(0) = -12 < 0$, $g'(3) = 66 > 0$

Vast. Piste (2,4)

17.5



sähkölinja kustannus 1100 m
- tiellä: a
- metsässä: $2a$

Sähkölinjo mossa:

$$f(x) = (10-x)a + y \cdot 2a$$
$$= (10-x)a + \sqrt{x^2+2^2} \cdot 2a$$
$$= \underbrace{a}_{>0 \text{ vakio}} \cdot \underbrace{\left[(10-x) + 2\sqrt{x^2+4}\right]}_{g(x)} \qquad (x^2+4)^{\frac{1}{2}}$$

$f(x)$ on pienin kun $g(x)$ on pienin, g jatk. ja derivoi. välillä $[0,10]$

$$g'(x) = -1 + 2 \cdot \frac{1}{2}(x^2+4)^{-\frac{1}{2}} \cdot 2x = -1 + \frac{1}{(x^2+4)^{\frac{1}{2}}} \cdot 2x = -1 + \frac{1 \cdot \sqrt{x^2+4}}{\frac{2x}{\sqrt{x^2+4}}} = 0$$