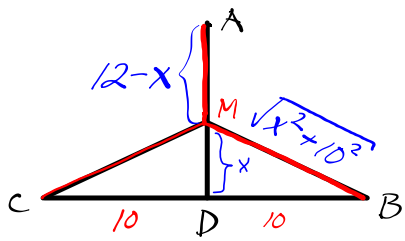
89.



$0 \le x \le 12$

$$f(x) = 12 - x + 2\sqrt{x^2+100} = 12 - x + 2(x^2+100)^{\frac{1}{2}}$$

Derivoidaan f(x): $f'(x) = -1 + 2 \cdot \frac{1}{2} \cdot (x^2+100)^{-\frac{1}{2}} \cdot 2x$

$$= \frac{2x}{\sqrt{x^2+100}} - 1 = \frac{2x - \sqrt{x^2+100}}{\sqrt{x^2+100}}$$

$f'(x) = 0$

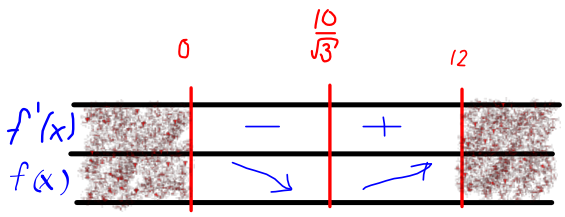
$2x - \sqrt{x^2+100} = 0$ Ehto: $x \ge 0$

$\sqrt{x^2+100} = 2x \quad \| \uparrow^2$

$x^2 + 100 = 4x^2$

$\vdots$

$x = \underset{(-)}{+} \frac{10}{\sqrt{3}}$



f ´(1) ≈ - 0,8

f ´(10) ≈ 0,4

Sähköjohtoa kuluu vähiten, kun x = $\frac{10}{\sqrt{3}}$ ≈ 5,8 (km)