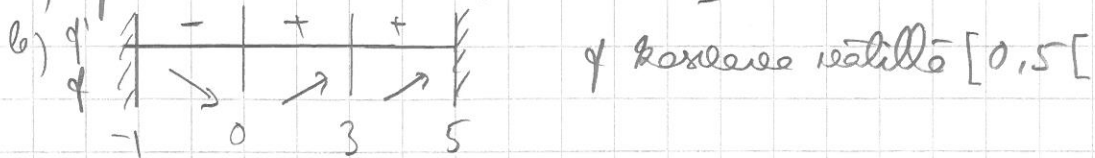


12. Funktion kulum tutaiminen

12.2 a) $f'(x) = 0 \Leftrightarrow x = 0$ tai $x = 3$



c) minimipiste: $x = 0$

12.6 $f(x) = \cos x - \frac{1}{2} \cos 2x$
 $= \cos x - \frac{1}{2} (2 \cos^2 x - 1)$ (maol s. 33 & 19)

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

dm. $t = \cos x$: $-t^2 + t + \frac{1}{2} = g(t)$, $t \in [-1, 1]$

$-1 \leq t \leq 1$ g jalk. ja derivo. väl. $[-1, 1]$

$g'(t) = -2t + 1 = 0 \Leftrightarrow t = \frac{1}{2}$

Puhteen loka g :n arvot:

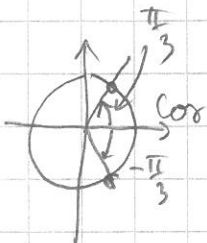
- päätepiste: $g(-1) = -(-1)^2 - 1 + \frac{1}{2} = -\frac{3}{2}$

$g(1) = -1^2 + 1 + \frac{1}{2} = \frac{1}{2}$

- g :n 0-piste: $g(\frac{1}{2}) = -(\frac{1}{2})^2 + \frac{1}{2} + \frac{1}{2} = \frac{3}{4}$

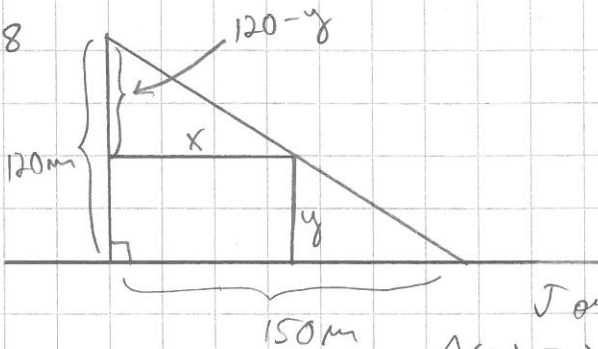
\Rightarrow suurin arvo: $\frac{3}{4}$ kun $t = \cos x = \frac{1}{2}$

$\Leftrightarrow x = \pm \frac{\pi}{3} + m2\pi, m \in \mathbb{Z}$



pienin arvo: $-\frac{3}{2}$ (kun $t = \cos x = -1 \Leftrightarrow x = \pi + m2\pi, m \in \mathbb{Z}$)

12.8



$\Delta \sim \Delta$ (kks) 1° yhtenäis kulum
 2° molemmille mole kulum

$\frac{120}{150} = \frac{120-y}{x} \quad | \cdot x$
 $\Rightarrow 4x = 5(120-y) \quad | :4$

$\Rightarrow x = \frac{5}{4}(120-y)$

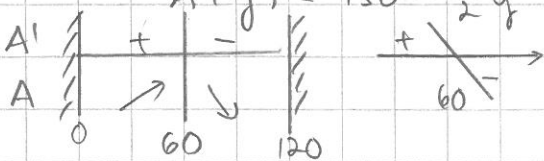
Tortin pinta-ala:

$A(y) = xy = \frac{5}{4}(120-y)y = 150y - \frac{5}{4}y^2$

A jalk. ja derivo. kun $0 < y < 120$

$A'(y) = 150 - \frac{5}{2}y = 0 \quad \Leftrightarrow y = \frac{150}{\frac{5}{2}} = \frac{2 \cdot 150}{5} = 60$

$x = \frac{5}{4}(120-60) = 75$



Parhaan suorakulmisen pinnan sivu: $x = 75$ m

ruutu korkeus \perp sivu: $y = 60$ m