28.01
26

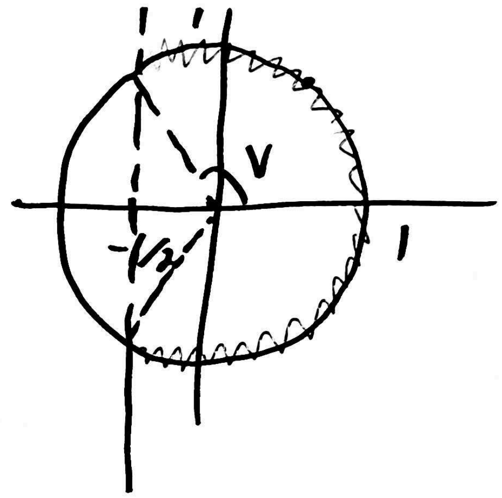
11 C Trigonometriske ulikheter.

$x \in [0, 360°]$

$$\cos x + \frac{1}{2} > 0$$

$$\Updownarrow$$

$$\cos x > \frac{-1}{2}$$



$\cos x = -1/2$

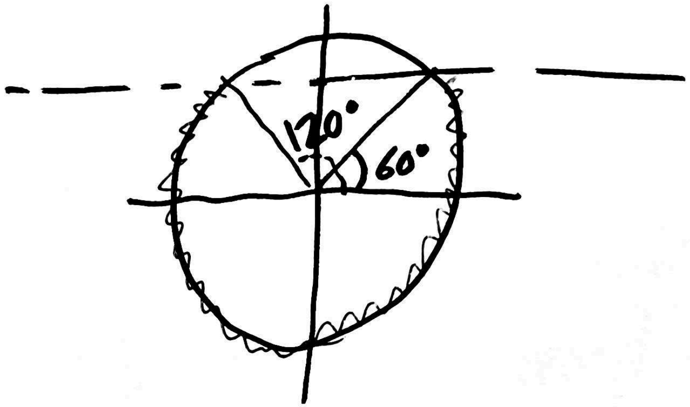
$x = +120°$

og $x = -120° + 360°$
$= 240°$

Løsningene er $\underline{[0, 120°\rangle \cup \langle 240°, 360°]}$

$$\sin x < \frac{\sqrt{3}}{2}$$

$x \in [0, 360°]$



$\left(\sin x = \sqrt{3}/2 \ , \quad x = 60° \text{ og } 120° \right)$

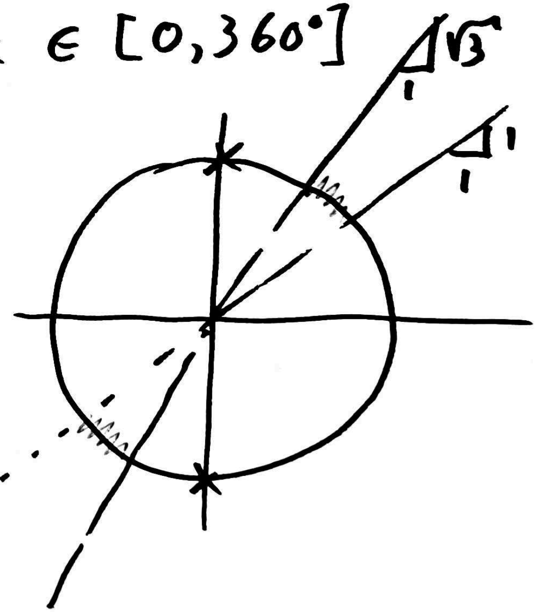
Løsningene er:

$\underline{x \in [0, 60°\rangle \cup \langle 120°, 360°]}$

$$1 \leq \tan x < \sqrt{3}$$

$\tan^{-1} 1 = 45°$ og $\tan^{-1} \sqrt{3} = 60°$

$x \in [0, 360°]$



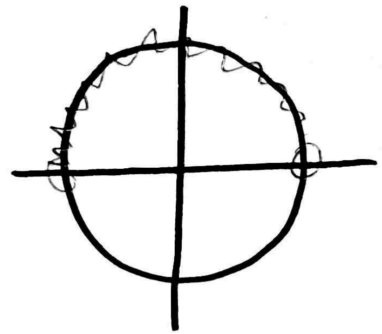
Løsningene er

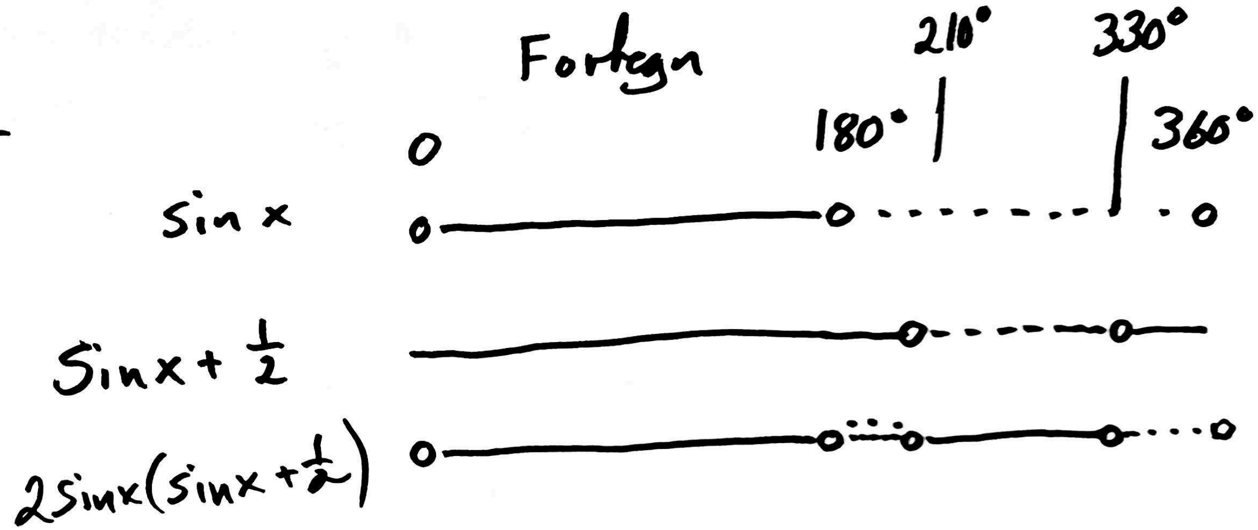
$\underline{x \in [45°, 60°\rangle \cup [225°, 240°\rangle}$

$$2\sin^2 x + \sin x \geq 0 \qquad x \in [0, 360°].$$

$$2\sin x \left(\sin x + \frac{1}{2}\right) \geq 0$$

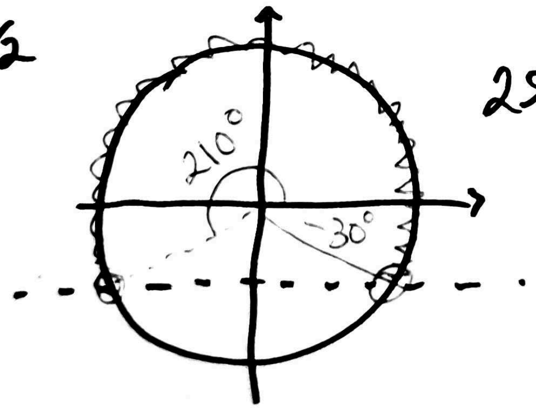
Fortegn til $\sin x$





$\sin x + \frac{1}{2} \geq 0$

$\sin x \geq -\frac{1}{2}$



Løsningene er

$$\underline{x \in [0, 180°] \cup [210°, 330°] \cup \{360°\}}$$

$\sin(2x) < 0 \qquad x \in [0, 360°]$.

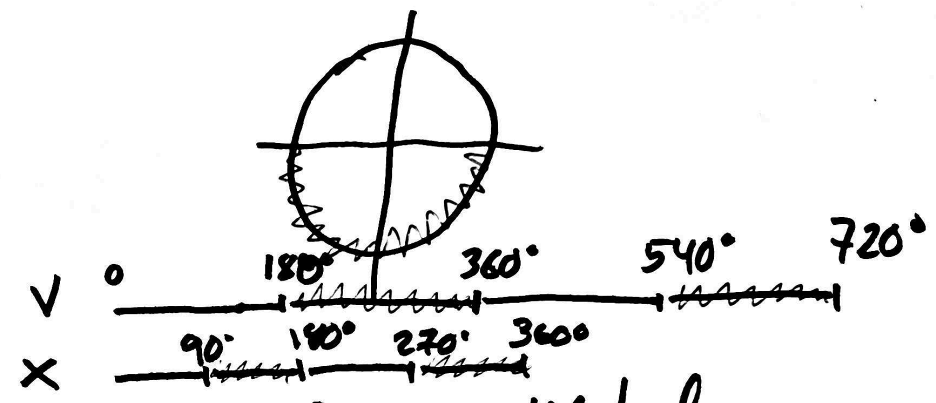
$2x = v$

$\sin(v) < 0$

$180° < v < 360°$ opp til hele omløp.

$180° < 2x < 360°$

$x = \frac{v}{2}$ gir $90° < x < 180°$ opp til halve omløp. $(180° \cdot k)$



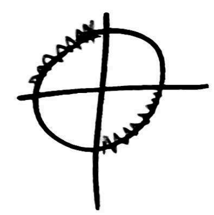
For $x \in [0, 360°]$ er derfor løsningene:

$\langle 90°, 180° \rangle \cup \langle 270°, 360° \rangle$

Alternativt:

$\sin 2x = 2\sin x \cos x$

$\sin(2x) < 0 \iff 2\sin x \cos x < 0$



Løsningene er x slik at $\sin x$ og $\cos x$ har forskjellige fortegn

så $x \in \langle 90°, 180° \rangle \cup \langle 270°, 360° \rangle$.

$4\sin^2 x - 1 < 0$ $\qquad \sin x = y$

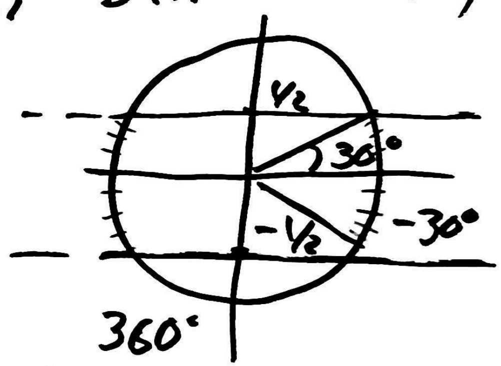
$x \in [0, 360^\circ]$

$4y^2 - 1 < 0$

$\iff y^2 - \frac{1}{4} < 0 \iff y^2 - \left(\frac{1}{2}\right)^2 < 0$

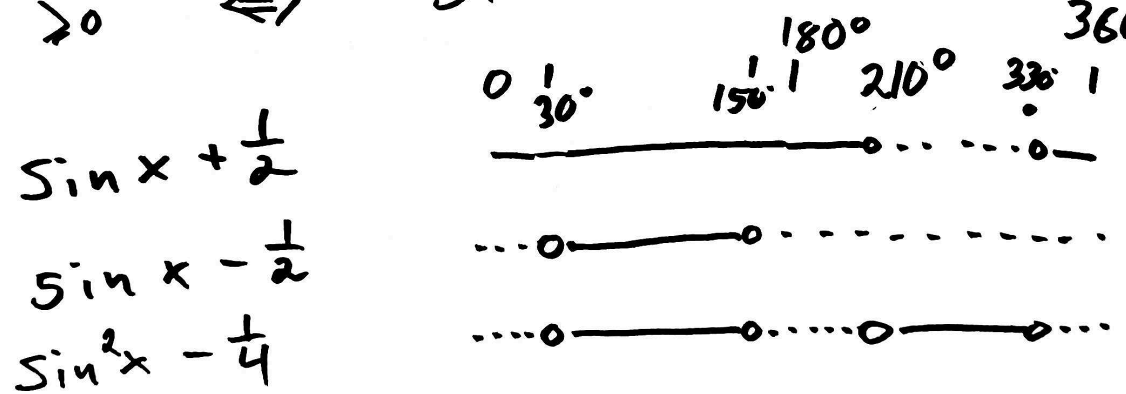
$\iff (y + \frac{1}{2})(y - \frac{1}{2}) < 0.$

$(\sin x + \frac{1}{2})(\sin x - \frac{1}{2}) < 0$ $\quad \left(\iff \sin^2 x < \frac{1}{4}\right)$



$\sin x + \frac{1}{2} \geq 0 \iff \sin x \geq -\frac{1}{2}$

$\sin x - \frac{1}{2} \geq 0 \iff \sin x \geq \frac{1}{2}$



Løsningene er $x \in [0, 30^\circ\rangle \cup \langle 150^\circ, 210^\circ\rangle \cup \langle 330^\circ, 360^\circ]$

$\sin x - \cos x > 0 \qquad x \in [0, 360°].$

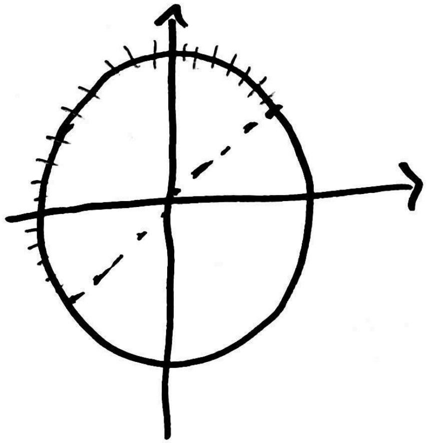
$\Updownarrow$

$\sin x > \cos x$

$\sin x = \cos x$

$\Leftrightarrow \tan x = 1$

$x = 45°, \ 225°.$



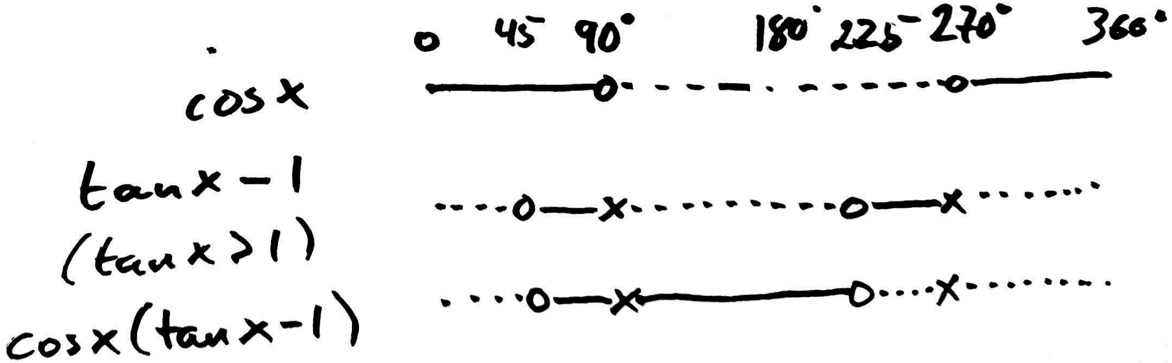
Løsningene er $\quad x \in \underline{\langle 45°, 225° \rangle}$

Alternativt: Anta $\cos x \neq 0$,

$\left(\frac{\sin x}{\cos x} - 1\right) \cos x > 0$

$(\tan x - 1) \cos x > 0$

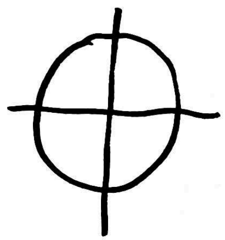
($\cos x = 0$: løsning $90°$)



Løsningene er

$\underline{\langle 45°, 225° \rangle}$

$\sin(2x+1) \geq 0$ $\qquad\qquad$ $x \in [0, \pi]$.



$2x+1 = v$

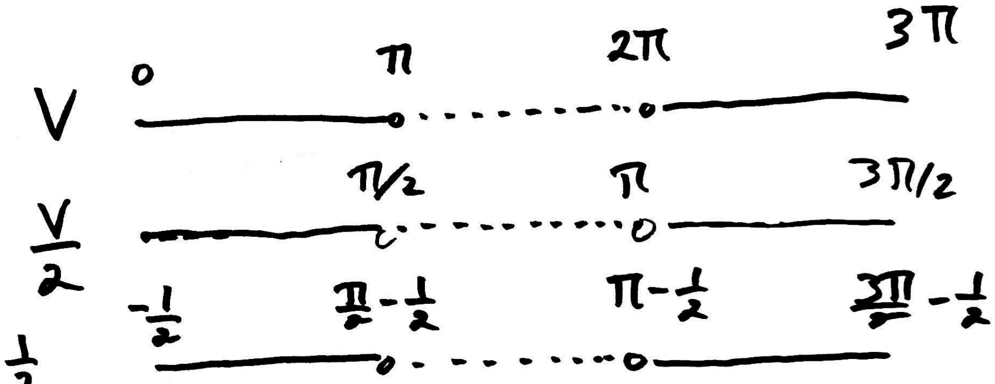
$\sin(v) \geq 0$

$0 \leq v \leq \pi$ $\qquad$ opp til hele omløp.

$0 \leq v - 2\pi k \leq \pi$ $\qquad$ $k \in \mathbb{Z}$

$2x = v - 1$

$x = \frac{v-1}{2} = \frac{v}{2} - \frac{1}{2}$.



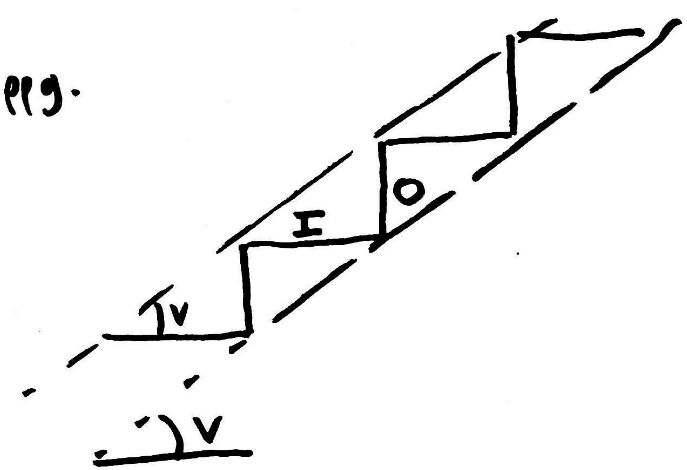
$x = \frac{v}{2} - \frac{1}{2}$

$[0, \frac{\pi}{2} - \frac{1}{2}] \cup [\pi - \frac{1}{2}, \pi]$

Løsningene er $\qquad$ $x \in \underline{[0, \frac{\pi}{2} - \frac{1}{2}] \cup [\pi - \frac{1}{2}, \pi]}$

Hint til oblig 5

oblig oppg.
oppg 6

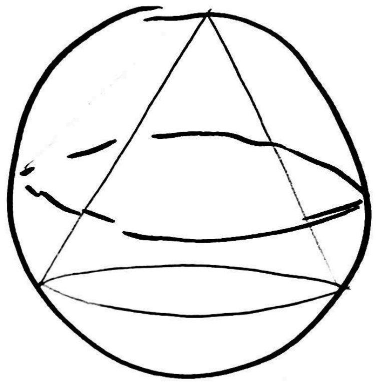


Trappeformelen

$20 + I = 62\text{cm}$

$\tan v = \frac{O}{I}$

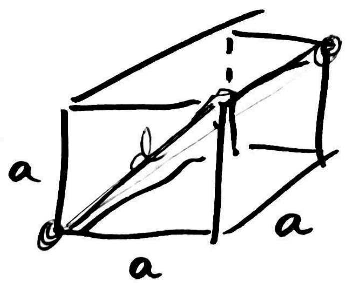
oppg 5



optimaliserings oppgave

Derivasjon.

oppg 1 e



Hva er $\frac{d}{a}$?

Pytagoras sin sats 2ganger.