Uke 8 ingen undervisning.

Uke 9 Integrasjon $\int f(x)\,dx$

2 | 1 kvadrant
3 | 4

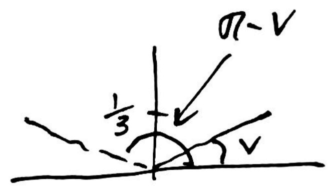
spørsmål

11.10

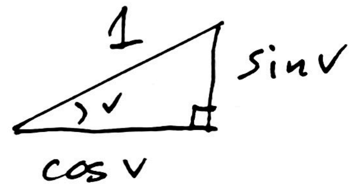
$v \in [0, \frac{\pi}{2}]$ $\quad \sin(v) = \frac{1}{3}$

b) $\sin(\pi - v)$

$= \sin(v) = \underline{\frac{1}{3}}$



se notater fra mandag. (hjemmesiden)



d) $\cos(v) = \pm\sqrt{1 - \sin^2(v)}$

1. kvadrant $\Rightarrow \cos v > 0$

$\cos^2 v + \sin^2 v = 1$

$\cos(v) = +\sqrt{1 - \left(\frac{1}{3}\right)^2} = \sqrt{\frac{8}{9}} = \frac{\sqrt{2 \cdot 2^2}}{3} = \underline{\underline{\frac{2\sqrt{2}}{3}}}$

$$\frac{d}{dx} \ln|\ln x| = \frac{1}{\ln x} \cdot (\ln x)'$$

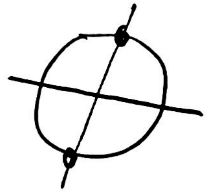
$$= \frac{1}{x \ln x}$$

oppg. 6

$\sin x - \cos x > 0 \iff \sin x > \cos x$

$x \in \langle \frac{\pi}{4}, \pi/2 \rangle$

$\cancel{\Leftrightarrow}$ $\tan x > 1$ hvis $\cos x > 0$



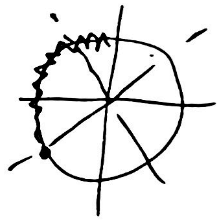
$\sin(\frac{\pi}{2}) = 1$

$\cos(\frac{\pi}{2}) = 0$

$x = \frac{\pi}{2} + 2\pi \cdot n$

$\cos x = 0$

$\tan x < 1$ hvis $\cos x < 0$



$\left(\begin{array}{l} x > -1 \\ \frac{x}{-1} = -x < 1 \end{array} \right)$

$x \in \langle \frac{\pi}{2}, \frac{5\pi}{4} \rangle$

Løsningen er $x \in \langle \frac{\pi}{4}, \frac{5\pi}{4} \rangle$ opp til hele omløp.

$\left(\begin{array}{l} u^2 < \frac{1}{2} \\ |u| < \frac{1}{\sqrt{2}} \end{array} \right)$

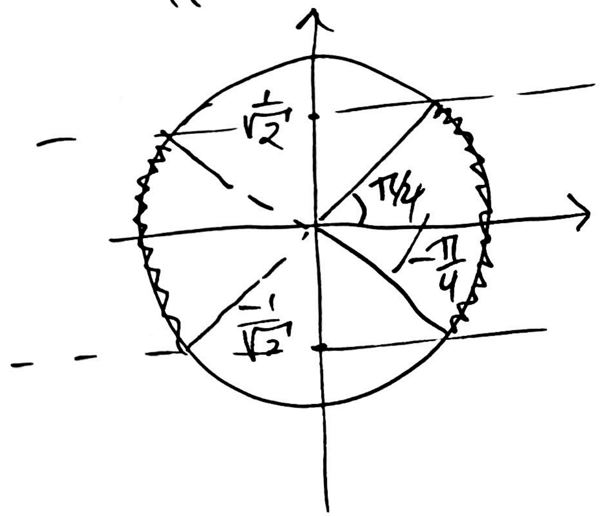
oppg

$\sin^2 x < \frac{1}{2}.$

$\frac{-1}{\sqrt{2}} < \sin x < \frac{1}{\sqrt{2}}$

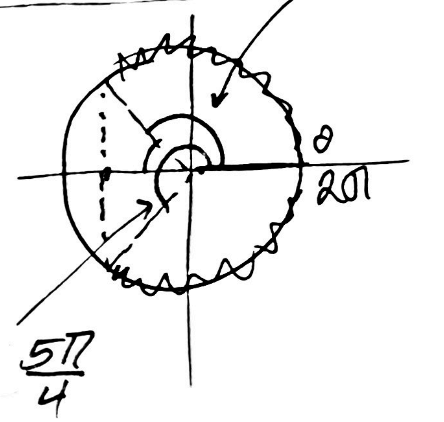
$x \in \langle -\frac{\pi}{4}, \frac{\pi}{4} \rangle \cup \langle \frac{3\pi}{4}, \frac{5\pi}{4} \rangle$

opp til et helt omløp.



11.72 $\underline{x \in [0,4]}$

a) $\sqrt{2}\cos\left(\frac{\pi}{2}x\right) + 1 > 0 \iff \underline{\cos(\underbrace{\tfrac{\pi}{2}x}_{U}) > \frac{-1}{\sqrt{2}}}$



$x \in [0,4] \iff U \in [0, 2\pi]$

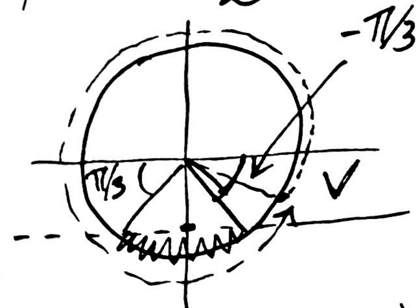
viser at løsningen er

$U \in [0, \frac{3\pi}{4}\rangle \cup \langle \frac{5\pi}{4}, 2\pi]$

$U = \frac{\pi}{2} \cdot x$ så $x = \frac{2}{\pi}U$

Løsningene er $\underline{x \in [0, \frac{3}{2}\rangle \cup \langle \frac{5}{2}, 4]}$

b) $2\sin(\overbrace{\tfrac{\pi}{2}x - \tfrac{\pi}{6}}^{V}) + \sqrt{3} < 0 \iff \sin(V) < \frac{-\sqrt{3}}{2}$



$V = \frac{\pi}{2}x - \frac{\pi}{6} \iff \frac{2}{\pi}\left(V + \frac{\pi}{6}\right) = x \iff \underline{x = \frac{2V}{\pi} + \frac{1}{3}}$.

$V \in [-\frac{\pi}{6}, 2\pi - \frac{\pi}{6}]$

Løsningene for V $\underline{\frac{4\pi}{3} < V < \frac{5\pi}{3}}$

(setter inn i $x(V) = \frac{2V}{\pi} + \frac{1}{3}$ ...)

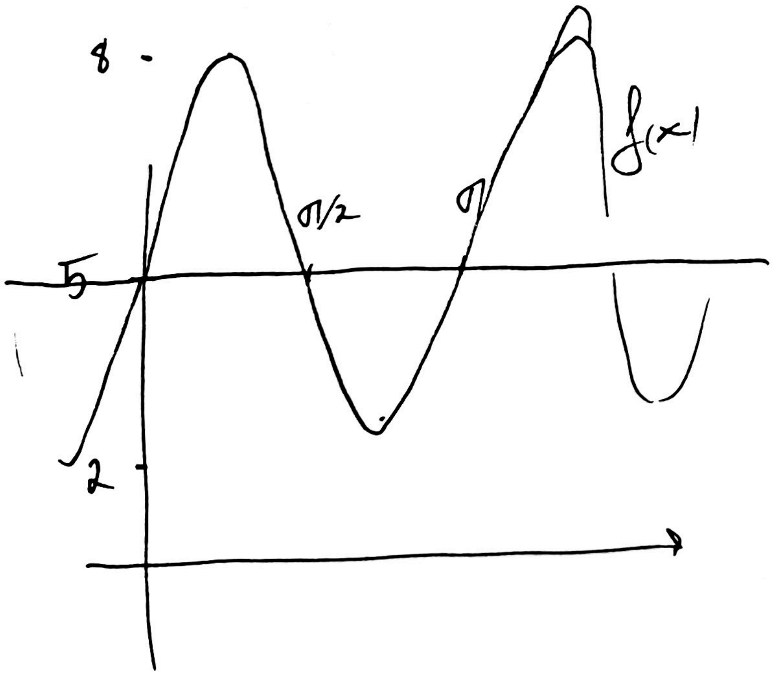
Løsningene $\underline{x \in \langle 3, \overbrace{3 + \tfrac{2}{3}}^{11/3} \rangle}$

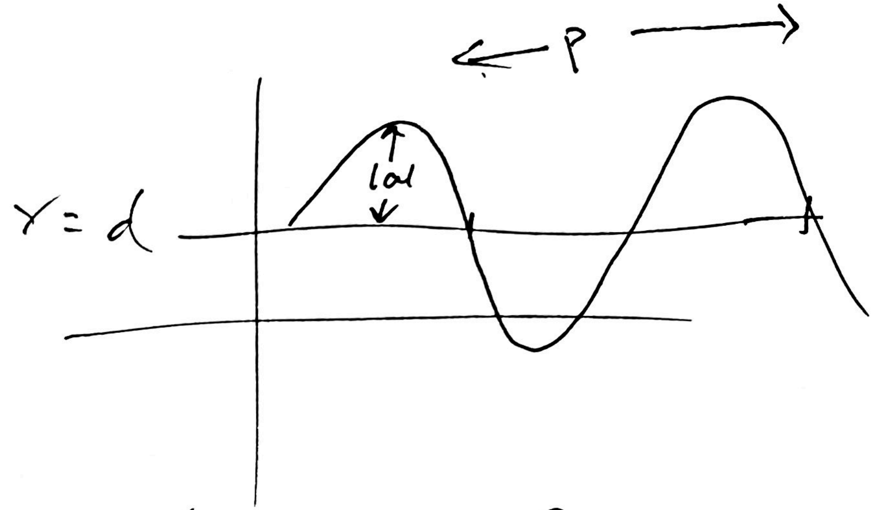
11.40 a) $f(x) = 3\sin(2x) + 5$

$a\sin(kx + c) + d$

$|k|P = 2\pi$ så $P = \frac{2\pi}{|k|}$ perioden

fasen $-c$





amplituden : 3

jamviktslinjen : 5

perioden : $\frac{2\pi}{2} = \pi$

Ex 2020 #8 a) Vis $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$ ...

b) Amplitude jamvektslinje og periode til $\sin^2(x)$

Addisjonsformelen for cosinus

$$\cos(u+v) = \cos(u)\cos(v) - \sin(u)\sin(v)$$

$u=v$ dobling av vinkel

$$\cos(2u) = \cos^2(u) - \sin^2(u)$$

Pythagoras $\cos^2(u) + \sin^2(u) = 1$ alle u.

Setter inn $\cos^2(u) = 1 - \sin^2(u)$

$$\cos(2u) = 1 - \sin^2(u) - \sin^2(u) \quad (= 2\cos^2(u) - 1)$$

$$= 1 - 2\sin^2(u)$$

a) $$\sin^2(u) = \frac{2\sin^2(u)}{2} = \underline{\underline{\frac{1-\cos(2u)}{2}}}$$

b)

$$\sin^2(u) = \frac{1}{2} - \frac{1}{2}\underbrace{\cos(2u)}_{\sin\left(\frac{\pi}{2} - 2u\right)}$$

$$= -\frac{1}{2}\sin\left(\frac{\pi}{2} - 2u\right) + \frac{1}{2}$$

$$= \frac{1}{2}\sin\left(2u - \frac{\pi}{2}\right) + \frac{1}{2}$$

$$\left(\sin(-v) = -\sin(v)\right)$$

jamvektslinjen $y = \frac{1}{2}$

amplituden $|a| = \frac{1}{2}$

perioden $\frac{2\pi}{|k|} = \pi$.

grafen er forskyvd $\frac{-(-\pi/2)}{2} = \frac{\pi}{4}$ mot høyre.