MA0001 - Martin Skatvedt - Øving 4

1

I $\sin(a+b) = \sin(a)\cos(b) + \cos(a)\sin(b)$

$\sin(a+a) = \sin(a)\cos(a) + \cos(a)\sin(a)$

$= \underline{\underline{2(\sin(a)\cos(a))}}$

II $\cos(a+b) = \cos(a)\cos(b) - \sin(a)\sin(b)$

$\cos(a+a) = \cos(a)\cos(a) - \sin(a)\sin(a)$

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

3.B.15 a) $\sin^{-1}(x)$ $\sin(x)$ $D_f: (-\infty, \infty)$ $V_f: [-1, 1]$

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

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

$\underline{\underline{D_f = [-1, 1] \text{ og } V_f = [-\frac{\pi}{2}, \frac{\pi}{2}]}}$

b) $\cos^{-1}(x)$ $\cos(x)$ $D_f: (-\infty, \infty)$ $V_f: [-1, 1]$

$\cos^{-1}(-1) = \pi$

$\cos^{-1}(1) = 0$

$\underline{\underline{D_f = [-1, 1] \quad V_f = [0, \pi]}}$

c) $\tan^{-1}(x)$ $\tan(x)$ $V_f: (-\infty, \infty)$

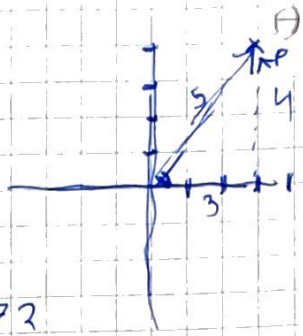
$\lim_{x \to -\infty} \tan^{-1}(x) = -\frac{\pi}{2}$

$\lim_{x \to \infty} \tan^{-1}(x) = \frac{\pi}{2}$

$\underline{\underline{D_f = (-\infty, \infty) \quad V_f = (-\frac{\pi}{2}, \frac{\pi}{2})}}$

3.5.4 $3\cos 3t + 4\sin 3t$

$a\cos \omega t + b\sin \omega t = r \cdot \cos(\omega t - \Theta)$



$P_{ab} = (3, 4)$

$r_p = \sqrt{3^2 + 4^2} = \underline{5}$

siden $a > 0$, $\Theta = \arctan\left(\frac{4}{3}\right) \approx 0{,}9272$

$= 5\cos(3t - 0{,}9272) = 5\cos(3(t - 0{,}31))$

Amplitude = 5

Periode = $\frac{2\pi}{3}$

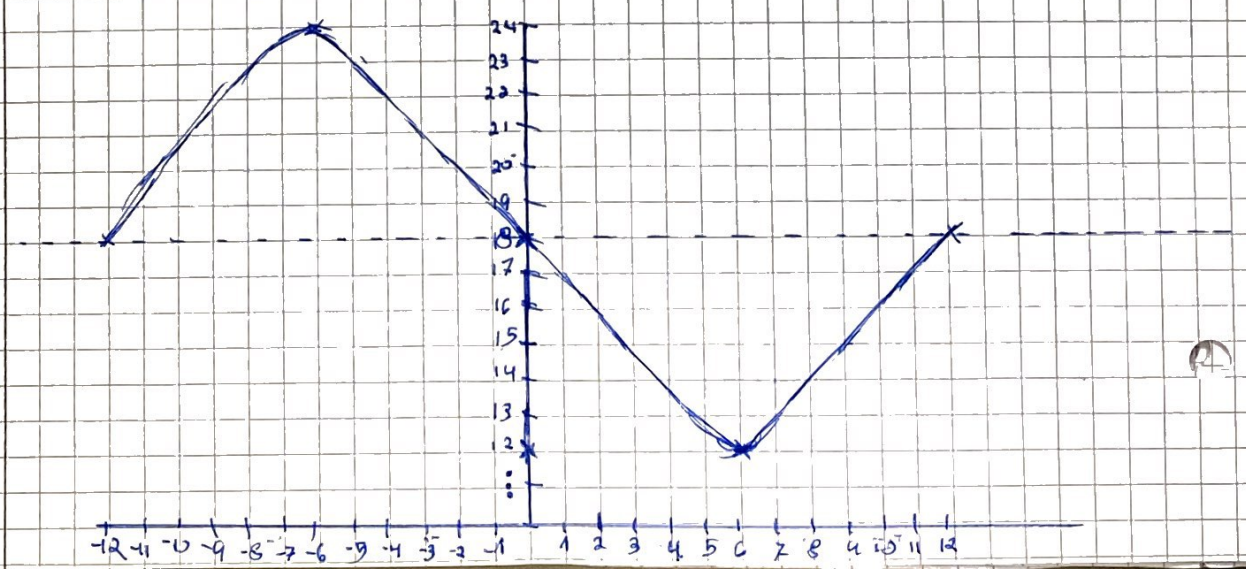
Forskyvning = 0,31

3.k.8 $T(t) = 18 - 6\sin\left(\frac{\pi}{12}t\right)$

a) Amplitude = 6

Gjennomsnittstemp. = 18

Periode = $\frac{2\pi}{\frac{\pi}{12}} = \frac{2\pi}{1} \cdot \frac{12}{\pi} = 24$



b) Lavest ved 06:00, på 12 C

Høgest ved 18:00, på 24 C

c) $T(t) = 21$

$18 - 6\sin\left(\frac{\pi}{12}t\right) = 21$

$6\sin\left(\frac{\pi}{12}t\right) = -3$

$\sin\left(\frac{\pi}{12}t\right) = -\frac{1}{2}$

$\frac{\pi}{12}t = \frac{7\pi}{6}$ og $\frac{\pi}{12}t = \frac{11\pi}{6}$

$t = \frac{7\pi}{6}\cdot\frac{12}{\pi} = 14$ og $t = \frac{11\pi}{6}\cdot\frac{12}{\pi} = 22$

Klokka 14 og 22 var tempen 21 C

5

$\sin^{-1}(x) + \cos^{-1}(x) = \frac{\pi}{2}$

La $\sin^{-1}(x) = \theta$

Da blir $x = \sin\theta = \cos\left(\frac{\pi}{2} - \theta\right)$

og $\cos^{-1}(x) = \frac{\pi}{2} - \theta = \frac{\pi}{2} - \sin^{-1}(x)$

Da får vi: $\cos^{-1}x + \sin^{-1}x = \frac{\pi}{2}$

6

$I = I_0 \cos^2(\theta)$

$I_0 = 2001x$

$I = 1501x$

$1501x = 2001x \cos^2(\theta)$

$\cos^2(\theta) = \frac{1501x}{2001x} = \frac{3}{4}$

$\cos^2(\theta) - \frac{3}{4} = 0 \rightarrow \cos^2(\theta) - \left(\frac{\sqrt{3}}{2}\right)^2 = 0$

$\left(\cos(\theta) - \frac{\sqrt{3}}{2}\right)\left(\cos(\theta) + \frac{\sqrt{3}}{2}\right) = 0$

$\cos\theta = \pm\frac{\sqrt{3}}{2}$

$\theta = 30^\circ$ og $\theta = 330^\circ$ og $\theta = 150^\circ$ og $\theta = 210^\circ$

Vinkelen θ kan ha vært $30^\circ, 150^\circ, 210^\circ, 330^\circ$