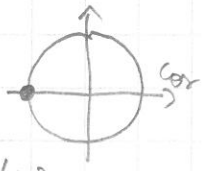
7.18 $f(x) = \dfrac{5}{4+3\underbrace{\cos 2x}_{-1 \le \downarrow \le 1}}$ ← 5 ← >0 vakio, ← nimittäjä > 0 aina

<u>Suurin arvo:</u> $\dfrac{5}{4+3\cdot(-1)} = \dfrac{5}{1} = \underline{5}$ kun $\cos 2x = -1$



$\Leftrightarrow 2x = \pi + k2\pi \quad |:2$

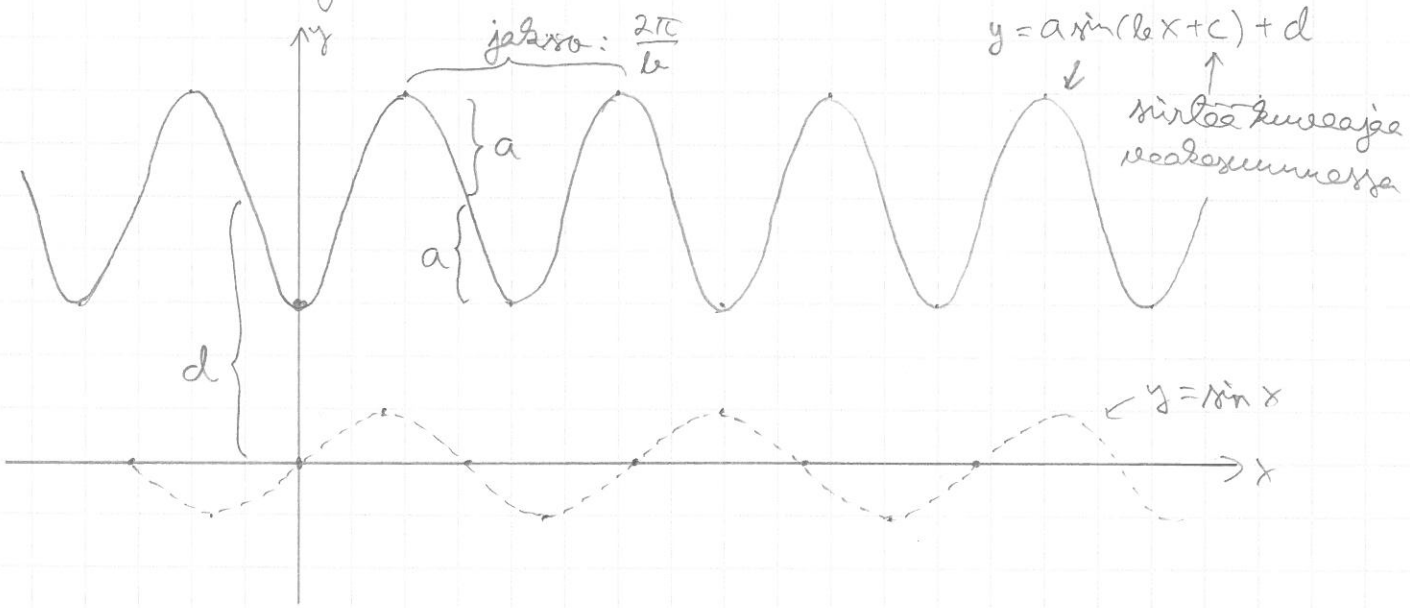
$\Leftrightarrow \underline{x = \frac{\pi}{2} + k\pi,\ k \in \mathbb{Z}}$

Pienin arvo: $\dfrac{5}{4+3\cdot 1} = \underline{\dfrac{5}{7}}$ kun $\cos 2x = 1$

$\Leftrightarrow 2x = k2\pi \quad |:2$

$\Leftrightarrow \underline{x = k\pi,\ k \in \mathbb{Z}}$

8. <u>Jaksolliset ilmiöt</u>



8.4 $f(x) = a\sin(bx+c)+d$ (°C), x: tuntien kertymästä

pienin arvo: $f(1{,}5) = -15$
klo 1.30

suurin arvo: $f(13{,}5) = 3$
klo 13.30

jakso: $2\cdot(13{,}5-1{,}5) = 2\cdot 12 = 24$ (h)

$d = \dfrac{-15+3}{2} = -6$ (suurimman ja pienimmän keskiarvo)

$a = 3 - d = 3-(-6) = 9$
suuri keskiarvo

TAI: $a = d - (-15) = -6+15 = 9$
keskiarvo pienin

TAI: $2a = 3-(-15) = 3+15 = 18 \quad |:2$
suuri pienin

$\Leftrightarrow a = 9$

jakso: $\dfrac{2\pi}{b} = 24 \quad |\cdot b \Leftrightarrow 2\pi = 24b \quad |:24 \Leftrightarrow b = \dfrac{2\pi}{24} = \dfrac{\pi}{12} \approx 0{,}2618$