

8.4 Lämpötila: $\varphi(x) = a \sin(bx + c) + d$ ($^{\circ}\text{C}$), x : tunteja kelloaika

klo 1,30 : $-15^{\circ}\text{C} \Rightarrow (1,5; -15)$

klo 13,30 : $3^{\circ}\text{C} \Rightarrow (13,5; 3)$

Oletetaan että lämpötila ei muutu
 -15°C :n ja 3°C :n välillä edelleen
 klo 1,30 : klo 13,30 : 12h

Lämpötilojen keskiarvo:

$$d = \frac{-15 + 3}{2} = -6 (^{\circ}\text{C})$$

$$a = 3 - (-6) = 9$$

$$|TA| : -6 - (-15) = 9$$

$$TA : 2a = 3 - (-15) = 18 \quad | : 2 \Rightarrow a = 9$$

jaksu : $2 \cdot 12\text{h} = 24\text{h}$

$\uparrow$
 1,30 ... 13,30

$$\Rightarrow \frac{2\pi}{b} = 24 \quad | \cdot \frac{b}{24}$$

$$\Rightarrow b = \frac{2\pi}{24} = \frac{\pi}{12} \approx 0,262$$

klo 1,30 : $\varphi(1,5) = 9 \cdot \sin\left(\frac{\pi}{12} \cdot 1,5 + c\right) - 6 = -15$

$$\Rightarrow 9 \sin\left(\frac{\pi}{12} \cdot 1,5 + c\right) = -9 \quad | : 9$$

$$\Rightarrow \sin\left(\frac{\pi}{12} \cdot 1,5 + c\right) = -1$$

$$\Rightarrow \frac{\pi}{12} \cdot 1,5 + c = \frac{3\pi}{2} + m2\pi$$

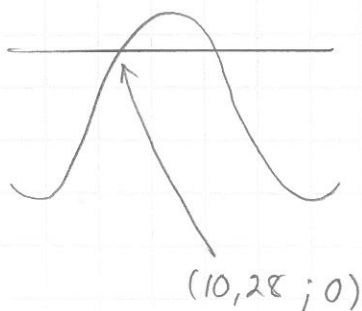
$$\Rightarrow c = \frac{3\pi}{2} - \frac{\pi}{12} \cdot 1,5 + m2\pi = \frac{11\pi}{8} + m2\pi, m \in \mathbb{Z}$$

Valitaan esim. $m=0 \Rightarrow c = \frac{11\pi}{8} \approx 4,32$

Siten $\varphi(x) = 9,00 \sin(0,262x + 4,32) - 6,00$

b) klo 12 : $\varphi(12) = \dots \approx 2,32424 \approx 2 (^{\circ}\text{C})$

c)



$$0,28 \cdot 60 = 16,8 \text{ (min)} \approx 20 \text{ (min)}$$

$$\Rightarrow \underline{10,20}$$

