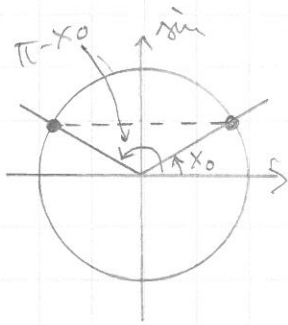


Yleisesti:

$$\sin x = a = \sin x_0 \quad \text{SINIYHTÄLÖ}$$



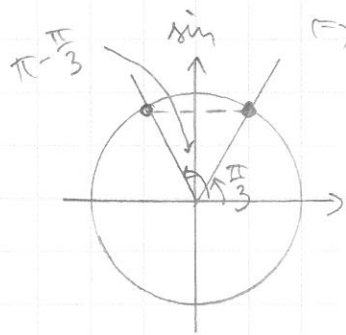
$$\Leftrightarrow x = x_0 + m2\pi \quad \text{tai} \quad x = \pi - x_0 + m2\pi, m \in \mathbb{Z}$$

Esim. 2

$$2 \sin 5x - \sqrt{3} = 0$$

$$\Leftrightarrow 2 \sin 5x = \sqrt{3} \quad | :2$$

$$\Leftrightarrow \sin 5x = \frac{\sqrt{3}}{2} = \sin 60^\circ = \sin \frac{\pi}{3}$$



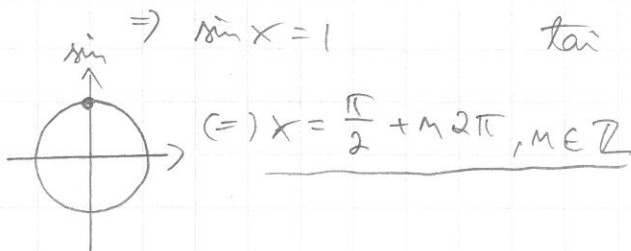
$$\Leftrightarrow 5x = \frac{\pi}{3} + m2\pi \quad \text{tai} \quad 5x = \pi - \frac{\pi}{3} + m2\pi = \frac{2\pi}{3} + m2\pi \quad | :5$$

$$\Leftrightarrow x = \frac{\pi}{15} + m \frac{2\pi}{5} \quad \text{tai} \quad x = \frac{2\pi}{15} + m \frac{2\pi}{5}, m \in \mathbb{Z}$$

Esim. 3

$$\sin^2 x + \sin x - 2 = 0$$

spuunnuttaja: $t = \sin x \Rightarrow t^2 + t - 2 = 0 \Leftrightarrow t = \begin{cases} 1 \\ -2 \end{cases}$



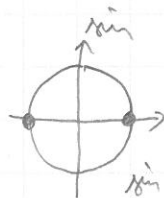
$$\Rightarrow \sin x = 1$$

tai

$$\sin x = -2 \quad \downarrow$$

$$-1 \leq \sin x \leq 1$$

$$\Leftrightarrow x = \frac{\pi}{2} + m2\pi, m \in \mathbb{Z}$$



$$x = 0 + m2\pi \quad \text{tai} \quad x = \pi - 0 + m2\pi$$

$$\Leftrightarrow x = m2\pi \quad \text{tai} \quad x = \pi + m2\pi, m \in \mathbb{Z}$$

$$\text{TAI: } x = m\pi, m \in \mathbb{Z}$$

5.8 a) $\sin x = 0$

b) $\sin x - 1 = 0 \Leftrightarrow \sin x = 1$

$$\Leftrightarrow x = \frac{\pi}{2} + m2\pi, m \in \mathbb{Z}$$



c) $\sin x \cdot (\sin x - 1) = 0$

$$\Leftrightarrow \sin x = 0 \quad \text{tai} \quad \sin x - 1 = 0$$

$$\text{ale} \Rightarrow x = m\pi \quad \text{tai} \quad x = \frac{\pi}{2} + m2\pi, m \in \mathbb{Z}$$

d) $\sin^2 x + \sin x = 0$

$$\Leftrightarrow \sin x (\sin x + 1) = 0$$

$$\Leftrightarrow \sin x = 0 \quad \text{tai} \quad \sin x + 1 = 0$$

$\downarrow a$

$$\Leftrightarrow \sin x = -1$$

$$x = m\pi \quad \text{tai} \quad x = -\frac{\pi}{2} + m2\pi, m \in \mathbb{Z}$$

