

E3 Ratkaise yhtälö

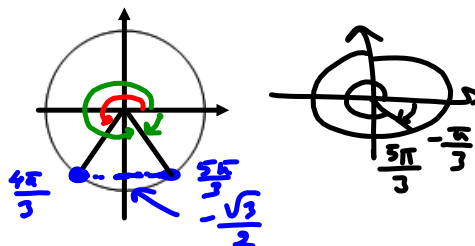
$$\sin x = \frac{-\sqrt{3}}{2}$$

$$-\frac{\pi}{2} < x < 2\pi$$

$$\left(\frac{-\sqrt{3}}{2} \approx -0,9 \right)$$

$$x = \frac{4\pi}{3} + n2\pi \text{ tai } x = \frac{5\pi}{3} + n2\pi$$

$$\left(\begin{array}{l} \sin \frac{4\pi}{3} = \frac{-\sqrt{3}}{2} \\ \sin \frac{5\pi}{3} = \frac{-\sqrt{3}}{2} \end{array} \right)$$



n	$\frac{4\pi}{3} + n2\pi$
0	$\frac{4\pi}{3} + 0 \cdot 2\pi = \frac{4\pi}{3}$ <u>käy</u>
1	$\frac{4\pi}{3} + 1 \cdot 2\pi$ ei käy
2	$\frac{4\pi}{3} + 2 \cdot 2\pi$ ei käy
-1	$\frac{4\pi}{3} - 1 \cdot 2\pi = \frac{4\pi}{3} - \frac{6\pi}{3} = \frac{-2\pi}{3}$ ei käy

n	$\frac{5\pi}{3} + n2\pi$
0	$\frac{5\pi}{3} + 0 \cdot 2\pi = \frac{5\pi}{3}$ <u>käy</u>
1	$\frac{5\pi}{3} + 1 \cdot 2\pi = \frac{5\pi}{3} + \frac{6\pi}{3} = \frac{11\pi}{3}$ <u>käy</u>
2	$\frac{5\pi}{3} + 2 \cdot 2\pi$ ei käy
-1	$\frac{5\pi}{3} - 2\pi$ ei käy

V: $\frac{4\pi}{3}, \frac{5\pi}{3}, -\frac{\pi}{3}$

E4 Ratkaise yhtälö

I tyyppi

$$\sin 2x = \sin x$$

$$2 \sin x \cos x = \sin x$$

$$2 \sin x \cos x - \sin x = 0$$

$$\sin x (2 \cos x - 1) = 0$$

NUKON NOLLASÄÄNTÖ

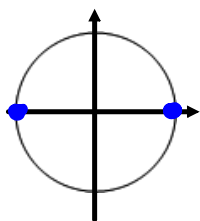
$$\sin x = 0$$

tai $2 \cos x - 1 = 0$

$$2 \cos x = 1/2$$

$$\cos x = \frac{1}{2}$$

$$x = \pm \frac{\pi}{3} + n2\pi$$



$$x = 0 + n2\pi$$

tai

$$x = \pi + n2\pi$$

$$\vee : x = n\pi \quad \text{tai} \quad x = \frac{\pi}{3} + n2\pi, \quad n \in \mathbb{Z}$$

(2 tyyppi)

$$\begin{aligned} \sin 2x \\ = 2 \sin x \cos x \end{aligned}$$

$$\frac{2 \sin x \cos x}{\sin x} = 2 \cos x$$

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

