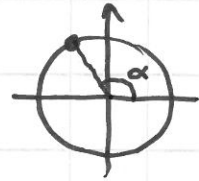


# SININ JA KOSININ OMINAISUUKSIA

- Kehäpiste on sama äärettömän monelle kulmalle



$$\begin{cases} \sin(\alpha + n \cdot 2\pi) = \sin \alpha \\ \cos(\alpha + n \cdot 2\pi) = \cos \alpha \end{cases}$$

ESIM  $\sin\left(4\frac{1}{3}\pi\right) = \sin\left(\underbrace{4\pi}_{2 \cdot 2\pi} + \frac{1}{3}\pi\right) = \sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$  ↑ taulukko

- Yksikköympyrän symmetria!

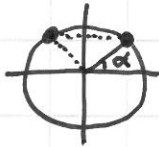
⇒ vastakulma  
 $-\alpha$



$$\begin{cases} \sin(-\alpha) = -\sin \alpha \\ \cos(-\alpha) = \cos \alpha \end{cases}$$

ESIM  $\sin\left(-\frac{\pi}{3}\right) = -\sin\frac{\pi}{3} = -\frac{\sqrt{3}}{2}$

⇒ suplementtikulma  
 $\pi - \alpha$   
 $180^\circ - \alpha$



$$\begin{cases} \sin(\pi - \alpha) = \sin \alpha \\ \cos(\pi - \alpha) = -\cos \alpha \end{cases}$$

ESIM 2

- Sin ja cos vaihtaminen keskenään

$$\begin{cases} \sin\left(\frac{\pi}{2} - \alpha\right) = \cos \alpha \\ \cos\left(\frac{\pi}{2} - \alpha\right) = \sin \alpha \end{cases}$$

ESIM 3

Sarja 1

3.1  
3.3  
3.4  
3.7  
3.10

Sarja 2

3.13  
3.14  
3.16  
3.17 →