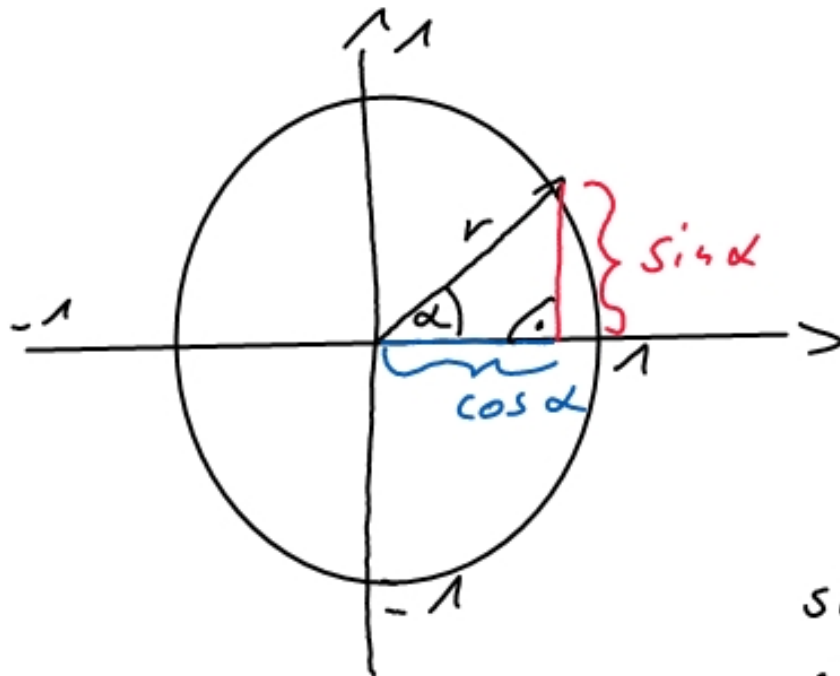


# Trigonometrie



$$r = 1$$

$$\sin \alpha = \frac{\text{Gegen}}{\text{Hyp.}}$$

$$\cos \alpha = \frac{\text{An}}{\text{Hyp.}}$$

$$\sin 200^\circ \approx -0,3$$

$$\cos 200^\circ \approx -0,8$$

$$|\sin \alpha| = |\cos \alpha|$$

$$\alpha_1 = 45^\circ$$

$$\alpha_2 = 135^\circ$$

$$\alpha_3 = 225^\circ$$

$$\alpha_4 = 315^\circ$$

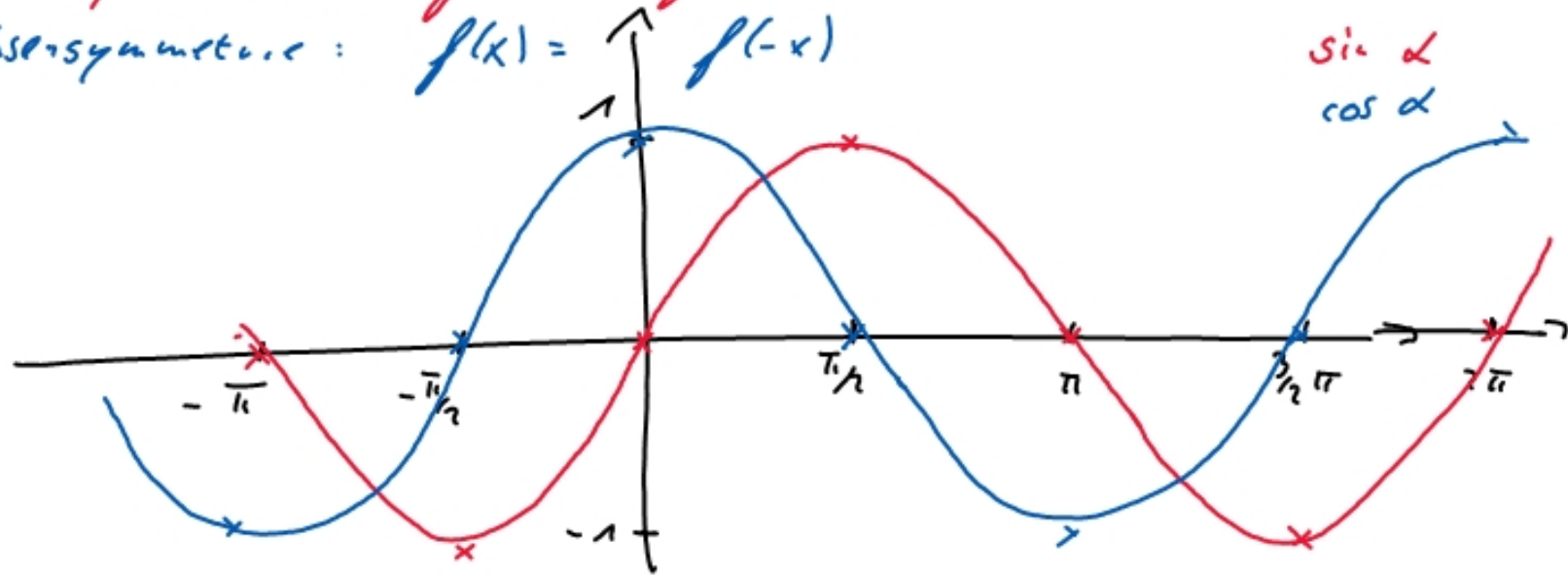
$$\sin^2 \alpha + \cos^2 \alpha = 1$$

Punktsymmetrie:

$$f(x) = -f(-x)$$

Achsensymmetrie:

$$f(x) = f(-x)$$



$$f(x) = a \cdot \sin(bx + c) + d$$

$a$  = Amplitudenfaktor

$b$  = Periodenfaktor

$c$  = Phasenverschiebung

$d$  = Amplitudenmodulation

$$P_{NEU} = \frac{P_{ALT}}{b}$$

x-Achse

y-Achse

$$f(x) = 2 \cdot \overset{2}{\cos}(3x) + 5$$

$$\overset{\text{GERADE}}{\cos} x \rightarrow [0; 1]$$

1. Amplituden:  $2 \cdot \overset{\cos}{[-1; 1]} + 5 = [-2; 2] + 5 = [3; 7]$   
 $2 \cdot [0; 1] + 5 = [5; 7]$

2. Periode:  $P = \frac{2\pi}{3} = \frac{2}{3}\pi$

$$P = \frac{\pi}{3} = \frac{1}{3}\pi$$

3. Symmetrie:  $f(x) = f(-x)$

$$2 \cdot \cos(3x) + 5 = 2 \cdot \cos(-3x) + 5 \quad | -5 \cdot \frac{1}{2}$$

$$\cos(3x) = \cos(-3x)$$

$$\cos(\alpha) = \cos(-\alpha)$$

$$3x = x$$

$$\begin{array}{l} [-3; 2]^2 \\ \downarrow \\ [-3; 0]^2 + [0; 2]^2 \\ [9; 0] \quad [0; 4] \\ \underbrace{\hspace{2cm}} \\ [0; 4] \end{array}$$

$$f(x) = \frac{1}{2} \sin\left(\frac{1}{3}x\right) - \frac{3}{2}$$

1) Amplitude:  $\frac{1}{2} [-1; 1] - \frac{3}{2} = [-\frac{1}{2}, \frac{1}{2}] - \frac{3}{2}$   
 $= [-2; -1]$

2) Periode:  $P_{\text{neu}} = \frac{2\pi}{1/3} = 6\pi$

3) Punktsymmetrie:  $f(x) \stackrel{?}{=} -[f(-x) + \frac{3}{2}]$

$$\frac{1}{3}x = \alpha$$

$$\underbrace{\left[\frac{1}{2} \sin\left(\frac{1}{3}x\right) - \frac{3}{2}\right]}_{f(x)} + \frac{3}{2} = - \underbrace{\left[\left(\frac{1}{2} \sin\left(-\frac{1}{3}x\right) - \frac{3}{2}\right) + \frac{3}{2}\right]}_{f(-x)}$$

$$\sin(\alpha) = -\sin(-\alpha)$$

$$\text{PS: } (0 | -\frac{3}{2})$$

$$\frac{1}{2} \sin\left(\frac{1}{3}x\right) = - \left[ \frac{1}{2} \sin\left(-\frac{1}{3}x\right) \right] \quad | \cdot 2$$

$$\sin\left(\frac{1}{3}x\right) = -\sin\left(-\frac{1}{3}x\right)$$