

Factorium

~~1+3=?~~ $f(x) = 3 - 2 \cdot \sin^4(0,5x + 3,5\pi)$

- > Wertebereich
- > Nullstellen
- > Periode
- > Symmetrie
- > Skizze

$$f(x) = 3 - 2 \cdot \left[\underbrace{\sin\left(\frac{1}{2}x + 3,5\pi\right)}_{\sin\left(\frac{1}{2}x\right) \cdot \underbrace{\cos(3,5\pi)}_0 + \cos\left(\frac{1}{2}x\right) \cdot \underbrace{\sin(3,5\pi)}_{-1}} \right]^4$$
$$f(x) = 3 - 2 \cdot (\cos\left(\frac{1}{2}x\right))^4$$
$$= 3 - 2 \cdot \cos^4\left(\frac{1}{2}x\right)$$

$$f(x) = 3 - 2 \cdot \cos^4 \left(\frac{1}{2}x \right)$$

$$W : 3 - 2 \cdot [0; 1] = 3 - [0; 2] = [3; 1]$$

$$y \in [1; 3]$$

$$\text{Period: } P_{\text{neu}} = \frac{P_{\text{ALT}}}{\frac{1}{2}} = \frac{\pi}{\frac{1}{2}} = 2\pi$$

$$f(x) = f(x + 2\pi)$$

$$= 3 - 2 \cdot \cos^4 \left[\frac{1}{2} \cdot (x + 2\pi) \right]$$

$$= 3 - 2 \cdot \left[\underbrace{\cos \left(\frac{1}{2}x + \pi \right)} \right]^4$$

$$= 3 - 2 \cdot [\cos(\frac{1}{2}x + \pi)]^4$$

$$\cos(\frac{1}{2}x) \cdot \underbrace{\cos(\pi)}_{-1} - \underbrace{\sin(\frac{1}{2}x)}_0 \cdot \underbrace{\sin(\pi)}_0$$

$$= 3 - 2 \cdot [-\cos(\frac{1}{2}x)]^4$$

$$= 3 - 2 \cdot \cos^4(\frac{1}{2}x) = f(x)$$

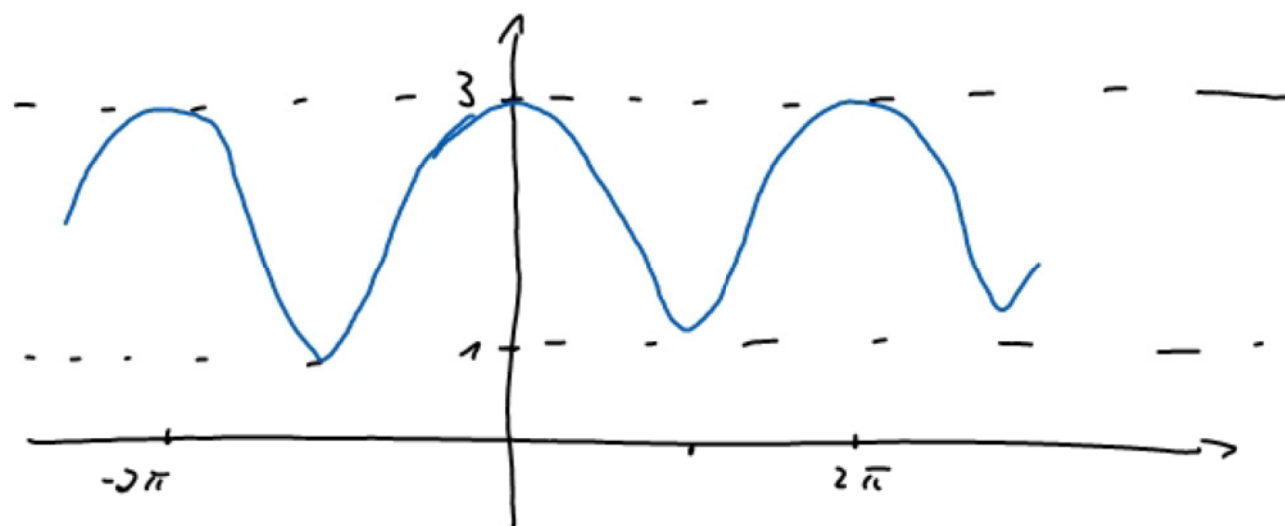
$$f(x) = f(-x)$$

$$3 - 2 \cdot \cos^4(\frac{1}{2}x) = 3 - 2 \cos^4(-\frac{1}{2}x) \quad | -3 \cdot (-\frac{1}{2})$$

$$\cos^4(\frac{1}{2}x) = \cos^4(-\frac{1}{2}x) \quad \checkmark$$

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

$$\sin(-x) = -\sin(x)$$



$$f(x) = -2 \cdot \cos^2(2,5\pi + 3x) + 3$$

$$g(x) = 1/2 \cdot \sin^5(4x - 5\pi) + 2,5$$

$$f(x) = -2 \cdot \left[\cos(2,5\pi + 3x) \right]^2 + 3$$

$$\underbrace{\cos(2,5\pi)}_0 \cdot \cos(3x) - \underbrace{\sin(2,5\pi)}_1 \cdot \sin(3x)$$

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

$$\text{W: } -2 \cdot [0; 1] + 3 = [0; -2] + 3 = [3; 1]$$

$$y \in [1; 3]$$

$$P_{NEU} = \frac{\pi}{3}$$

$$f(x) = f(x + \frac{\pi}{3})$$

$$f(x) = -2 \cdot \left[\sin(3(x + \frac{\pi}{3})) \right]^2 + 3$$

$$\sin(3x + \pi)$$

$$\sin(3x) \cdot \underbrace{\cos(\pi)}_{-1} + \cos(3x) \cdot \underbrace{\sin(\pi)}_0$$

$$= -2 \cdot \left[-\sin(3x) \right]^2 + 3$$

$$= -2 \cdot \sin^2(3x) + 3 = f(x)$$

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

$$-2 \cdot \sin^2(3x) + 3 = -2 \cdot \sin^2(-3x) + 3 \quad | -3 \cdot (-1/2)$$

$$\sin^2(3x) = \sin^2(-3x)$$

$$= [\sin(-3x)]^2 = [-\sin(3x)]^2$$

$$= \sin^2(3x) \quad \checkmark$$

$$f(x) = -\frac{1}{2} \sin^2(4x) + 2,5$$

$$y \in [2; 3]$$

$$P_{\text{unkt.}} (0 | 2,5)$$

$$P_{\text{NEU}} = \frac{1}{2}\pi$$