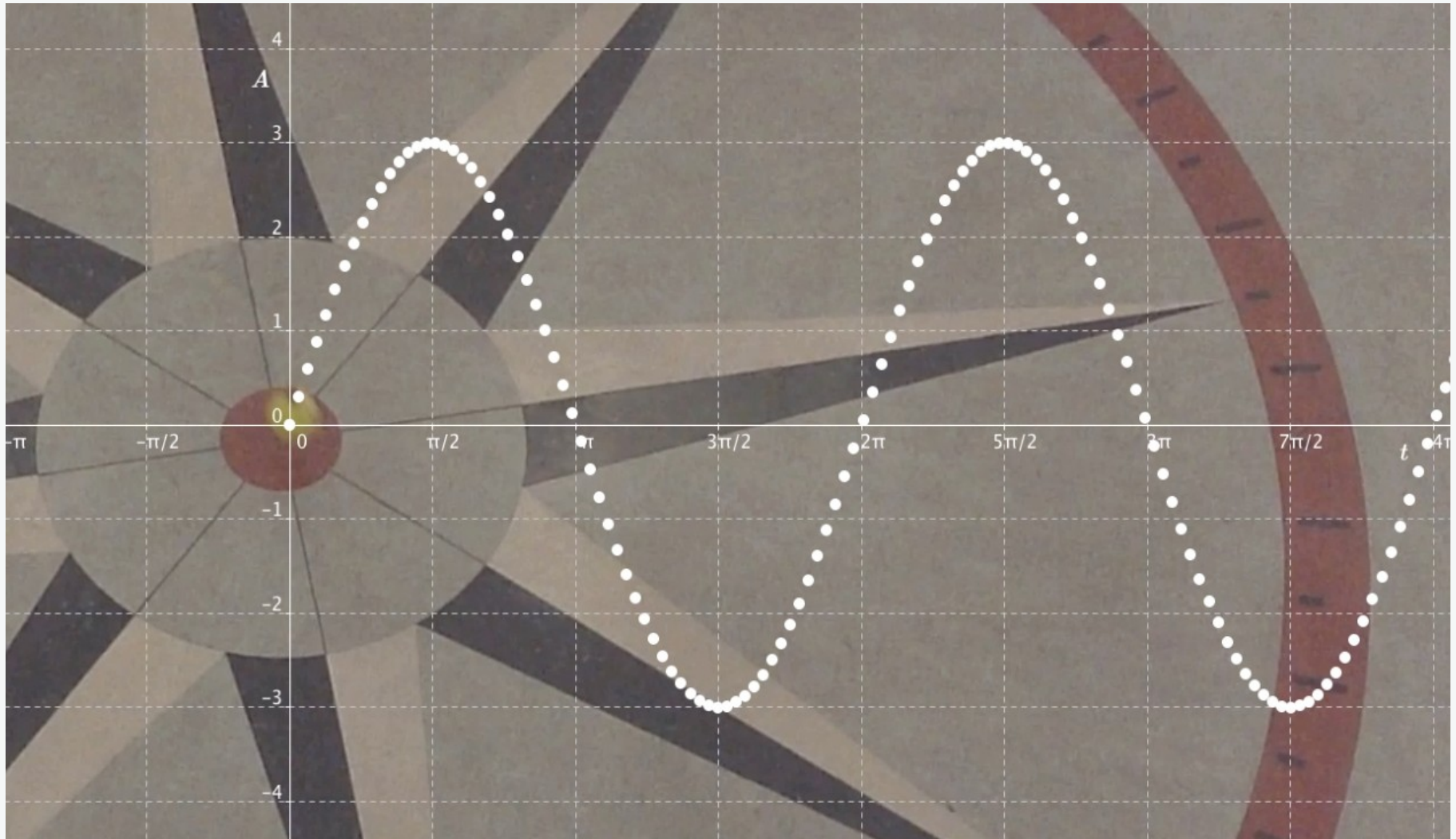


*Sine, Cosine*

# Sine, Cosine



*Functions  $y = \sin x$  and  $y = \cos x$*

Draw the following functions:

Exercise 1:

$$\sin x, \quad 2 \sin x, \quad 0.5 \sin x$$

Exercise 2:

$$\sin x, \quad \sin(2x), \quad \sin(0.5x)$$

Exercise 3:

$$\sin x, \quad \sin\left(x + \frac{\pi}{2}\right), \quad \sin\left(x + \frac{\pi}{6}\right)$$

Exercise 4:

$$\sin x, \quad \sin^2 x, \quad 2 \sin^2 x$$

Exercise 5:

$$\sin x, \quad |\sin x|, \quad 2 |\sin x|$$

# Sine: Solution 1

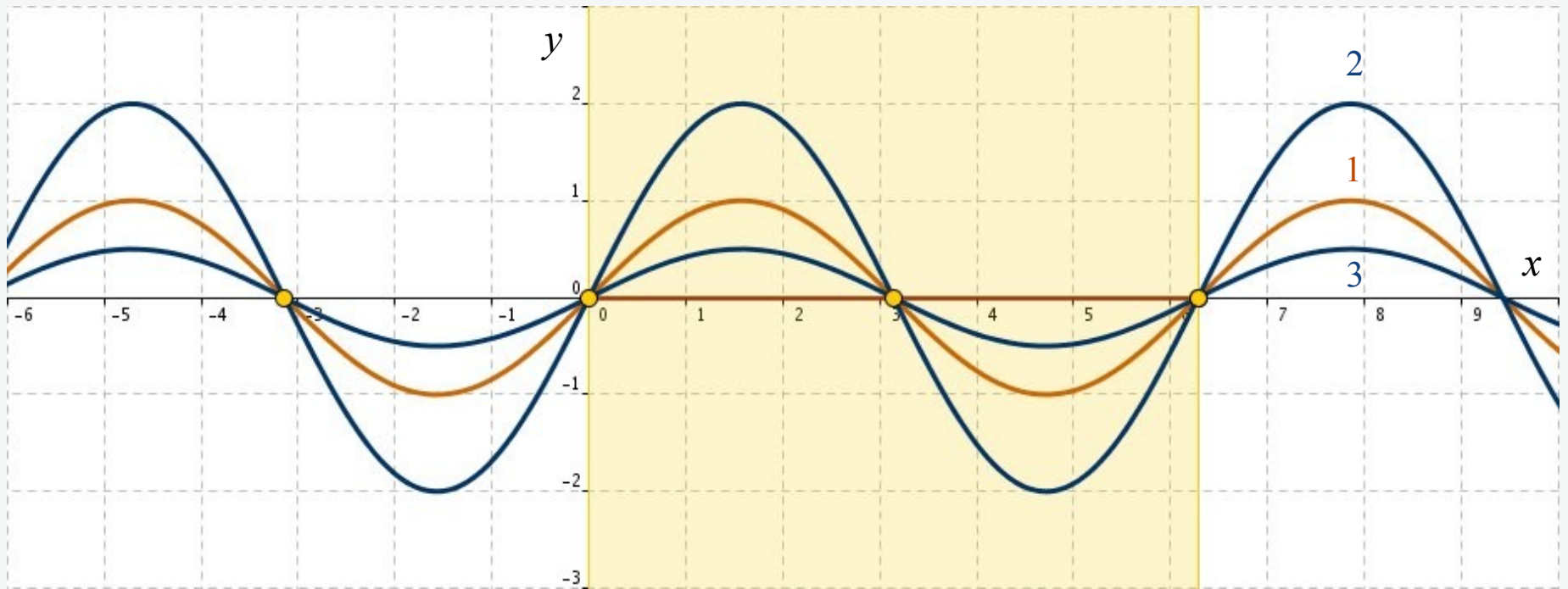


Fig. 1: Functions  $y = \sin x$  (1),  $y = 2 \sin x$  (2) and  $y = 0.5 \sin x$  (3)

$$y = \sin x \quad (1), \quad y = 2 \sin x \quad (2), \quad y = 0.5 \sin x \quad (3)$$

## Sine: Solution 2

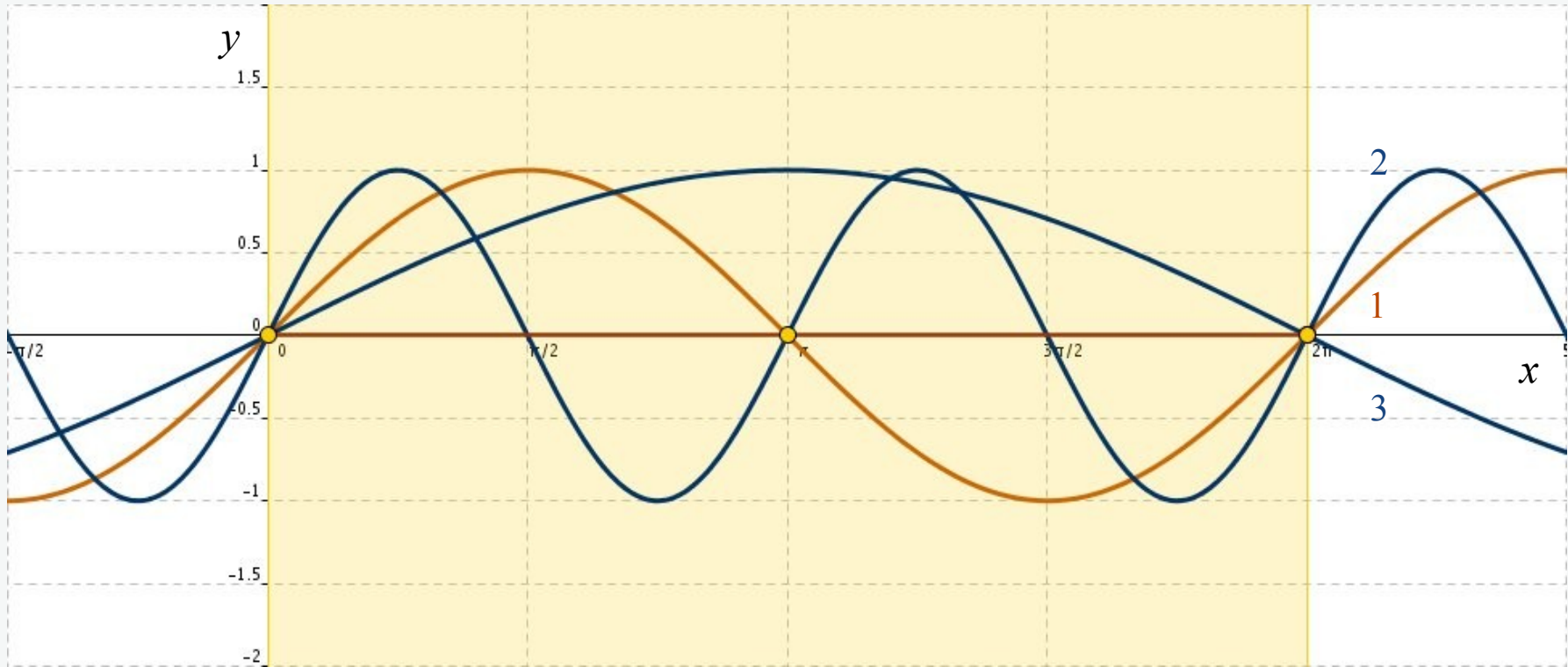


Fig. 2: Functions  $y = \sin x$  (1),  $y = \sin(2x)$  (2) and  $y = \sin(0.5x)$  (3)

$$y = \sin x \quad (1), \quad y = \sin(2x) \quad (2), \quad y = \sin(0.5x) \quad (3)$$

## Sine: Solution 3



Fig. 3: Functions  $y = \sin x$  (1),  $y = \sin(x + \pi/2)$  (2) and  $y = \sin(x + \pi/6)$  (3)

$$y = \sin x \quad (1), \quad y = \sin\left(x + \frac{\pi}{2}\right) \quad (2), \quad y = \sin\left(x + \frac{\pi}{6}\right) \quad (3)$$

## Sine: Solution 4

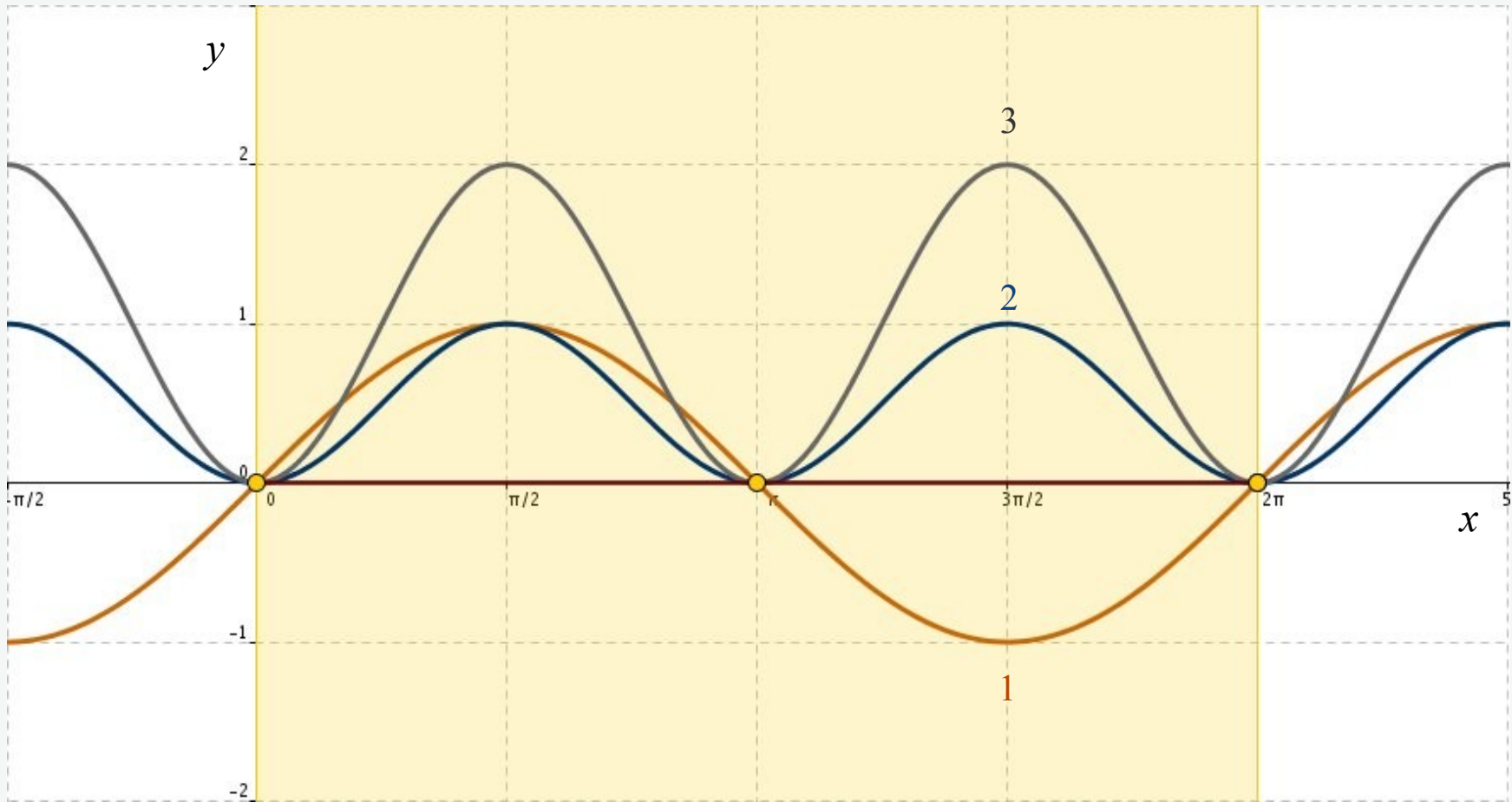


Fig. 4: Functions  $y = \sin x$  (1),  $y = \sin^2 x$  (2) und  $y = 2 \sin^2 x$  (3)

$$y = \sin x \quad (1), \quad y = \sin^2 x \quad (2), \quad y = 2 \sin^2 x \quad (3)$$

## Sine: Solution 5

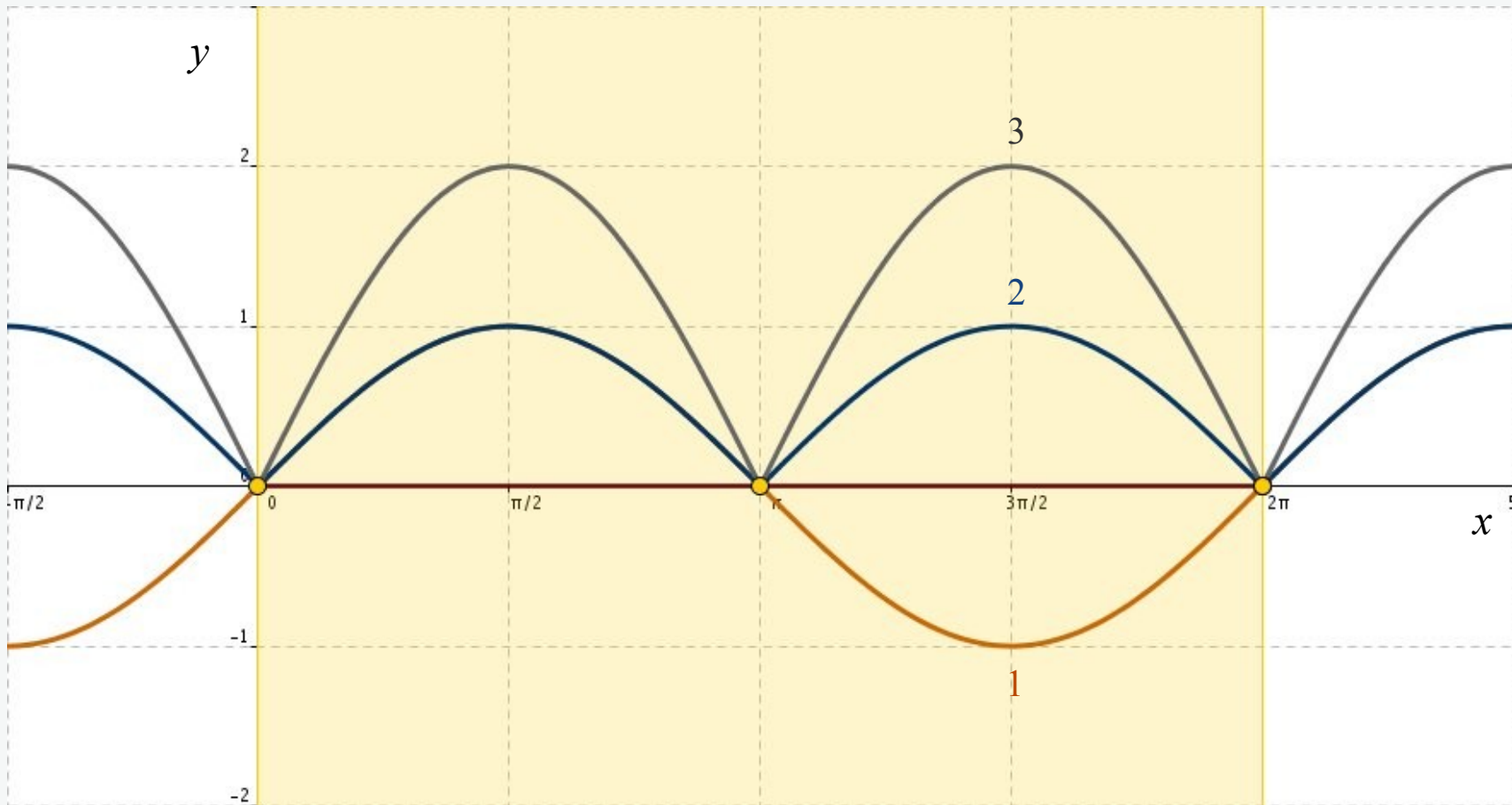


Fig. 5: Functions  $y = \sin x$  (1),  $y = |\sin x|$  (2) und  $y = 2|\sin x|$  (3)

$$y = \sin x \quad (1), \quad y = |\sin x| \quad (2), \quad y = 2|\sin x| \quad (3)$$



Exercise 6:

Draw the function

$$y = 2 \sin\left(2x - \frac{\pi}{3}\right)$$

with the following steps

$$\begin{aligned} \sin x &\rightarrow \sin(2x) \rightarrow y = 2 \sin(2x) \rightarrow \\ &\rightarrow y = 2 \sin\left(2\left(x - \frac{\pi}{6}\right)\right) = 2 \sin\left(2x - \frac{\pi}{3}\right) \end{aligned}$$

Exercise 7:

$$\sin x, \quad \sin x + 2.5, \quad 0.5 \sin(2x) - 2$$

# Sine: Solution 6

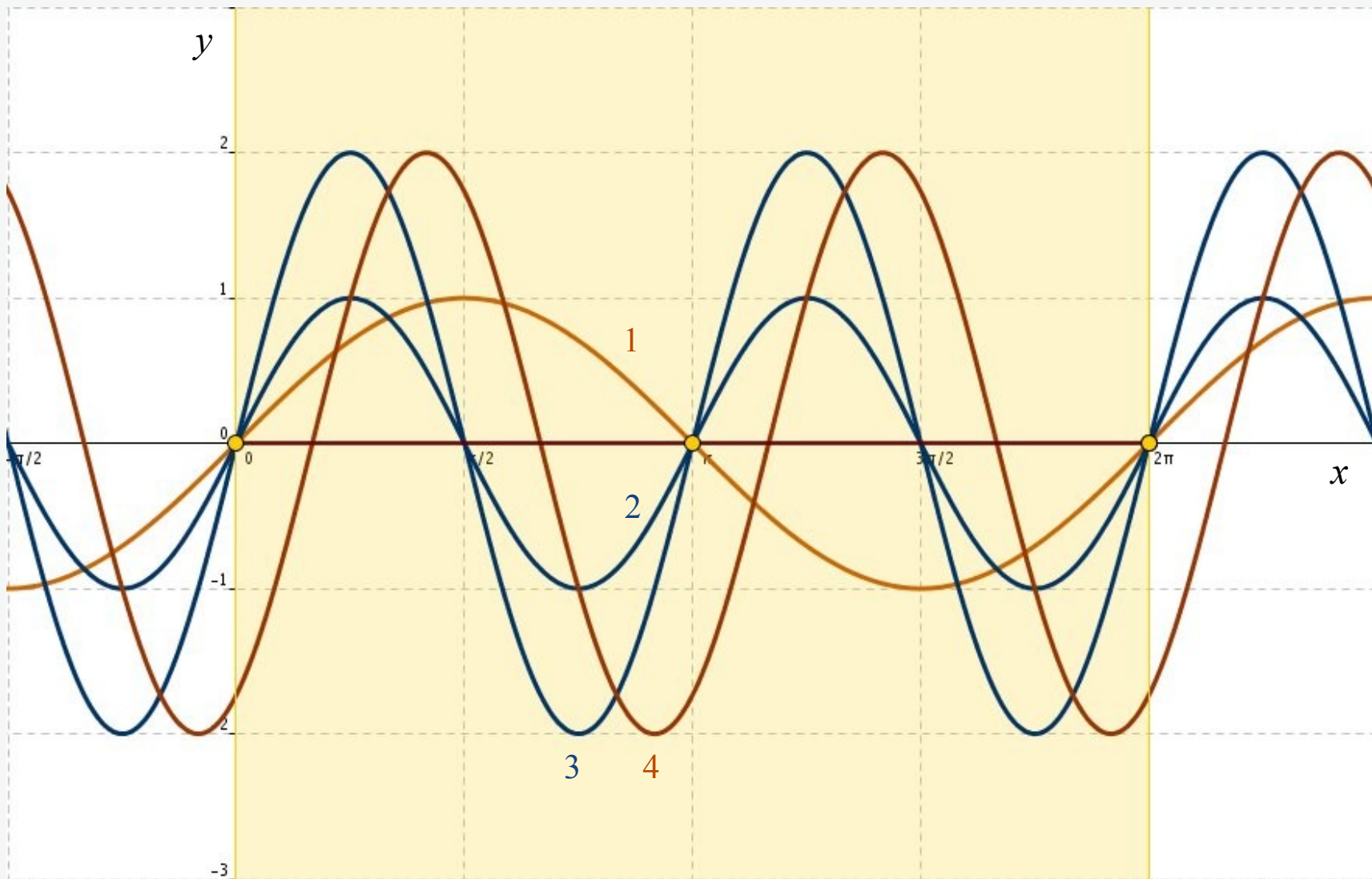


Fig. 6: Functions  $y = \sin x$  (1),  $y = \sin(2x)$  (2),  $y = 2 \sin(2x)$  (3) and  $y = 2 \sin(2x - \pi/3)$  (4)

$$\sin x \quad (1), \quad \sin(2x) \quad (2), \quad y = 2 \sin(2x) \quad (3), \quad 2 \sin\left(2x - \frac{\pi}{3}\right) \quad (4)$$

# Sine: Solution 7

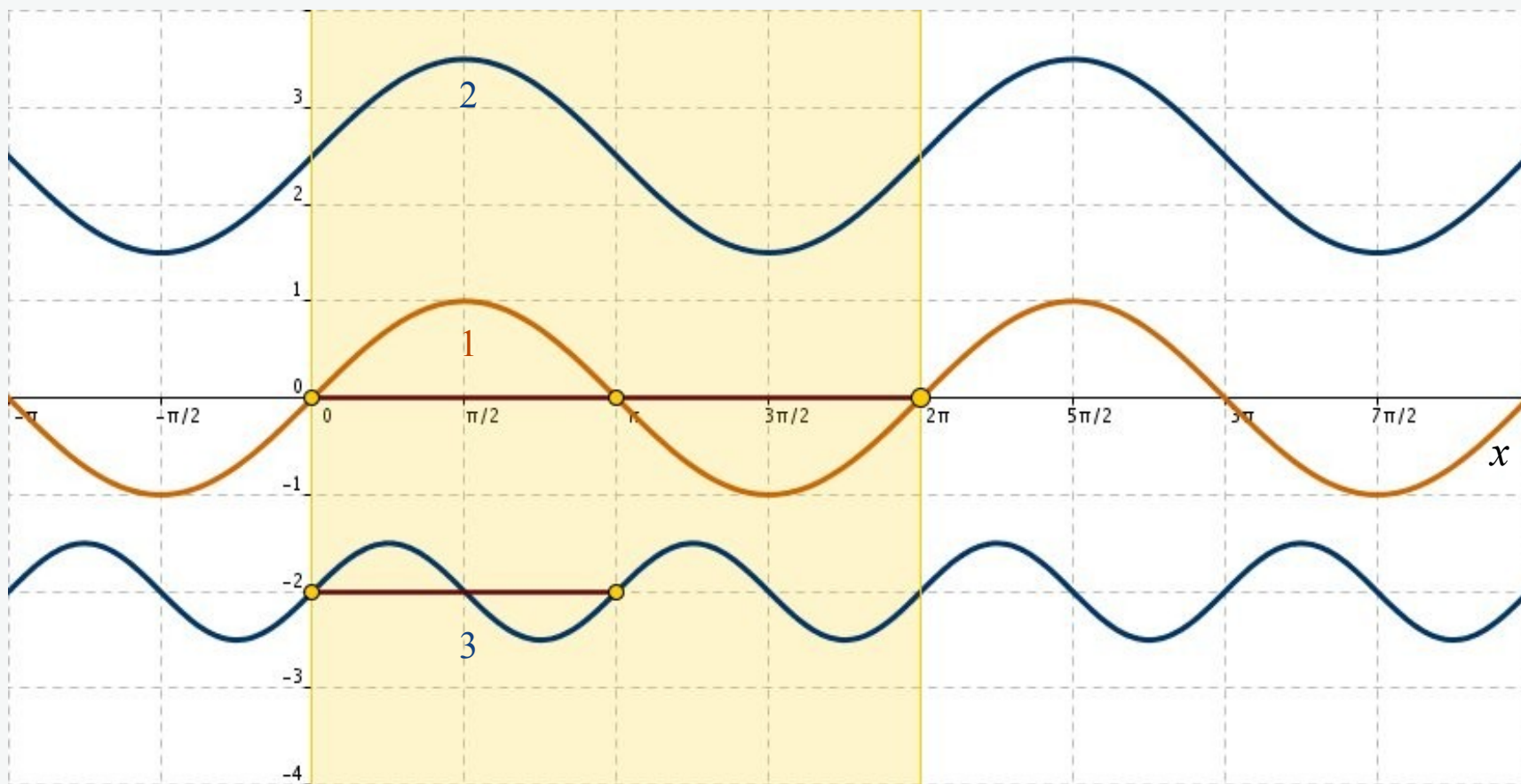


Fig. 7: Functions  $y = \sin x$  (1),  $\sin x$  (2),  $2 \sin(2x)$  (3) and  $2 \sin(2x - \pi/3)$  (4)

$$y = \sin x \quad (1), \quad y = \sin x + 2.5 \quad (2), \quad y = 0.5 \sin(2x) - 2 \quad (3)$$

Exercise 8:

$$\cos\left(x + \frac{\pi}{4}\right), \quad 2 \cos\left(x - \frac{\pi}{4}\right)$$

Exercise 9:

$$\cos x, \quad \cos^2 x, \quad 2 \cos^2 x$$

Exercise 10:

$$\cos^2 x, \quad \cos^4 x, \quad 2 \cos^4 x$$

## Cosine: Solution 8

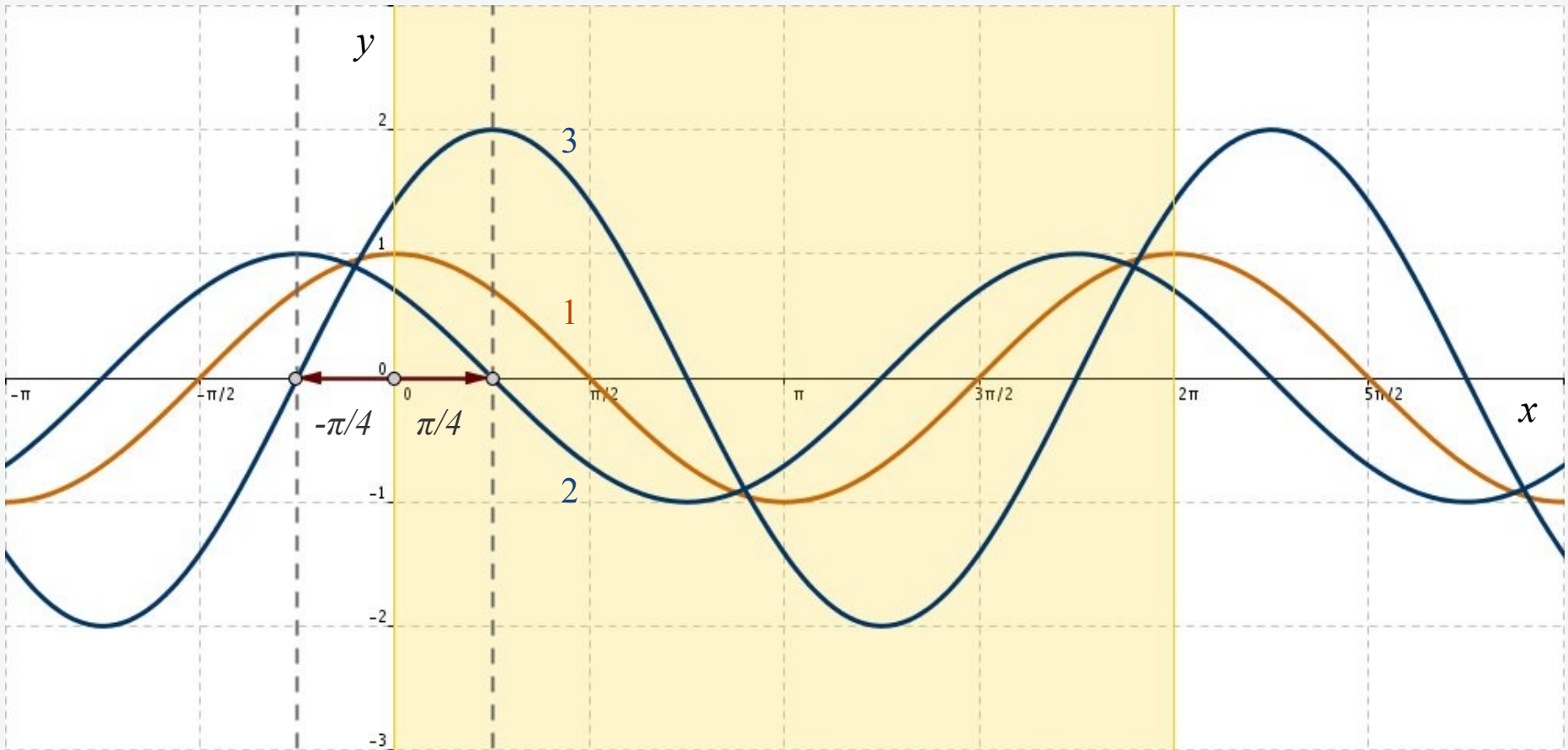


Fig. 8: Functions  $y = \cos x$  (1),  $y = \cos(x + \pi/4)$  (2) and  $y = 2 \cos(x - \pi/4)$  (3)

$$y = \cos x \quad (1), \quad \cos\left(x + \frac{\pi}{4}\right) \quad (2), \quad 2 \cos\left(x - \frac{\pi}{4}\right) \quad (3)$$

## Cosine: Solution 9

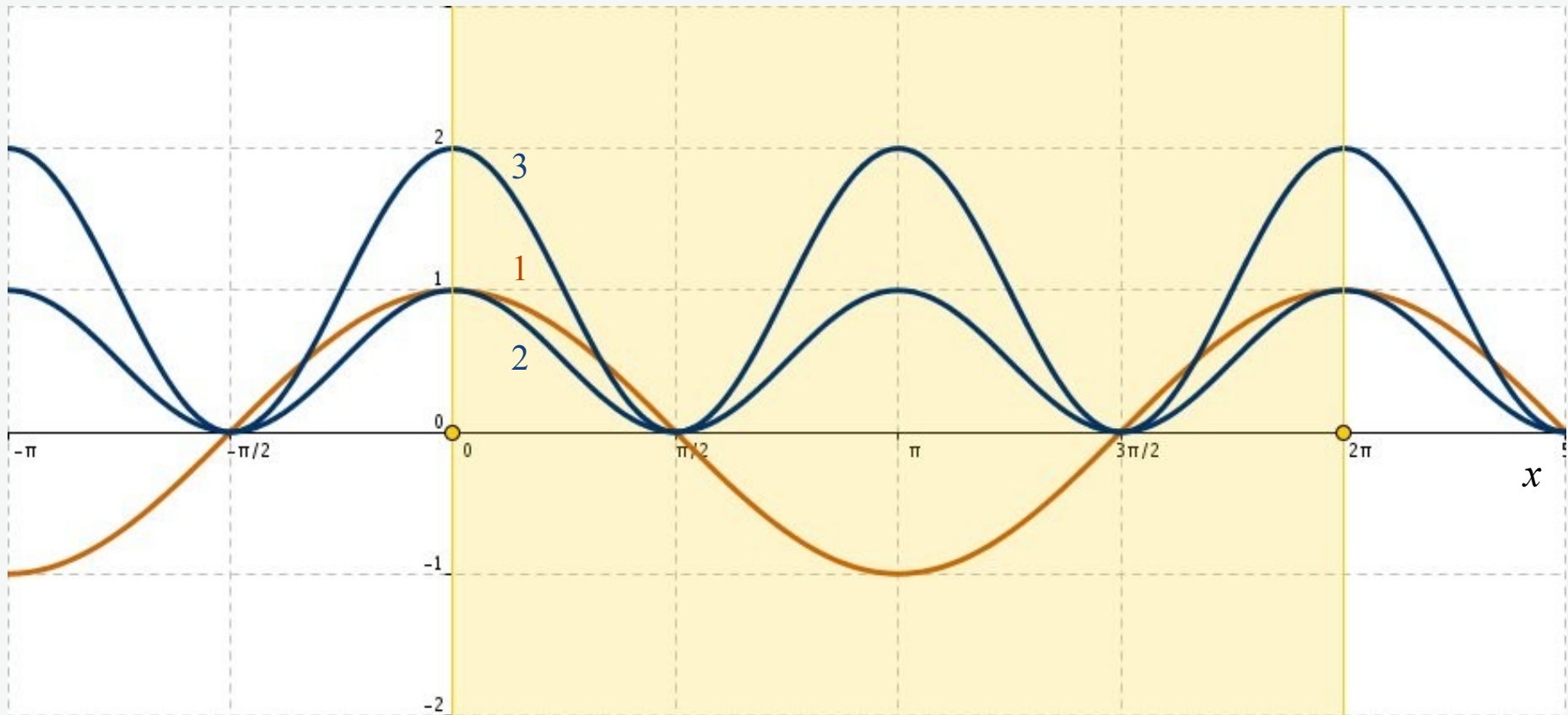


Fig. 9: Functions  $y = \cos x$  (1),  $y = \cos^2 x$  (2) and  $y = 2 \cos^2 x$  (3)

$$y = \cos x \quad (1), \quad y = \cos^2 x \quad (2), \quad y = 2 \cos^2 x \quad (3)$$

## Cosine: Solution 10

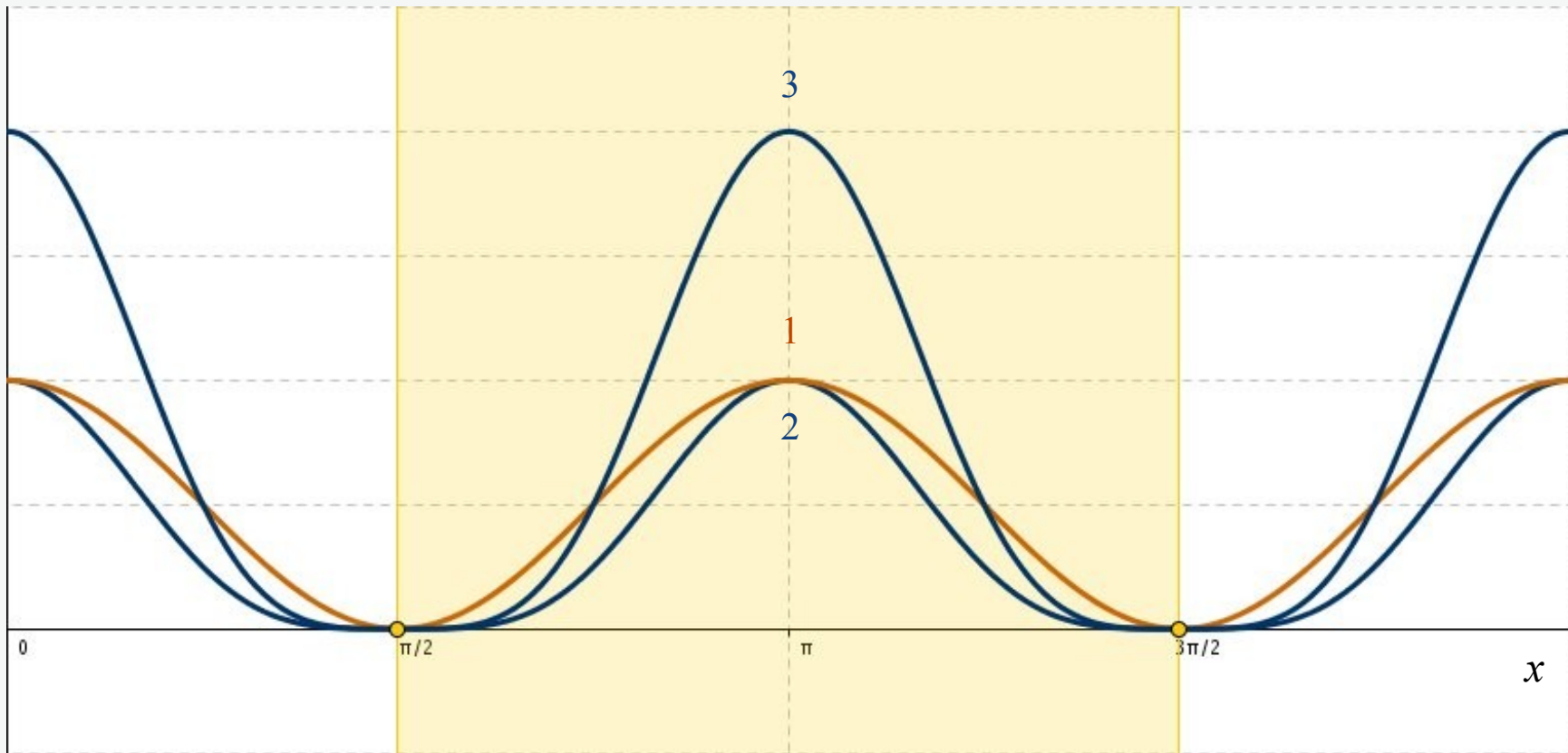


Fig. 10: Functions  $y = \cos^2 x$  (1),  $y = \cos^4 x$  (2) and  $y = 2 \cos^4 x$  (3)

$$y = \cos^2 x \quad (1), \quad y = \cos^4 x \quad (2), \quad y = 2 \cos^4 x \quad (3)$$