Преобразование графиков тригонометрических функций

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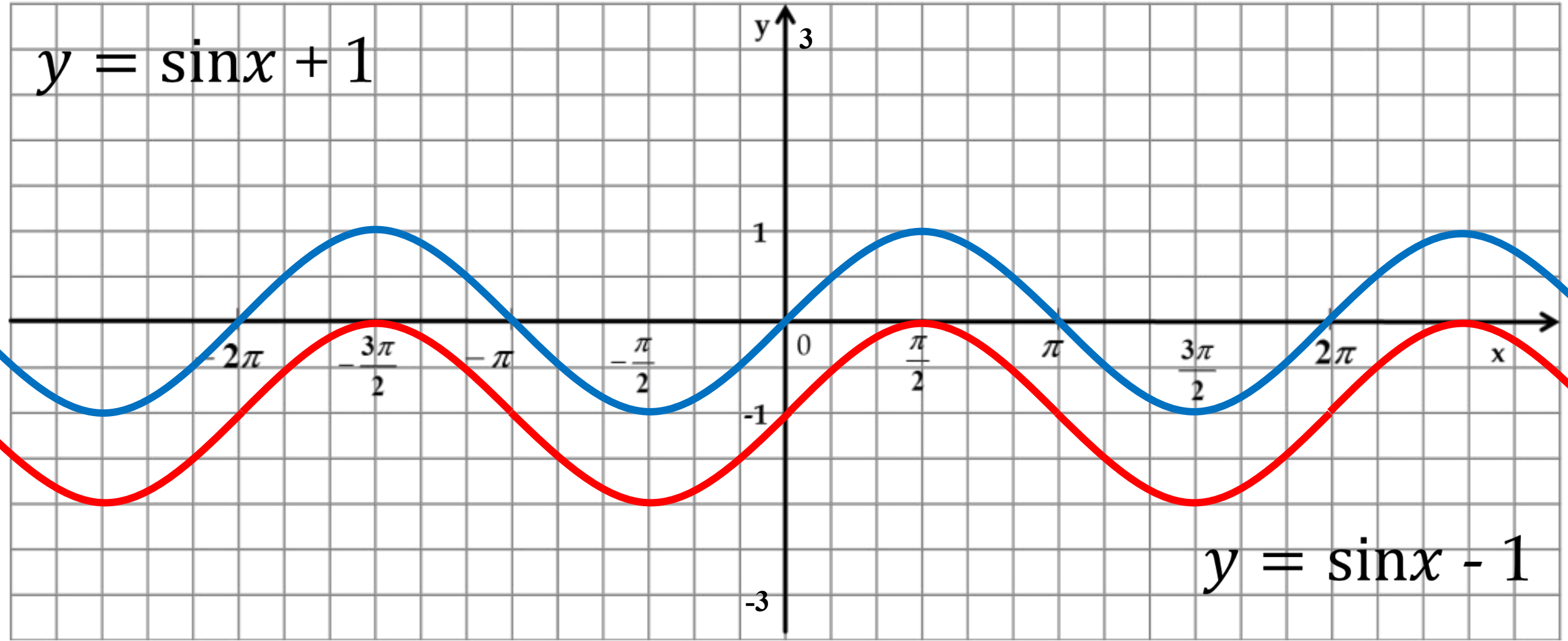
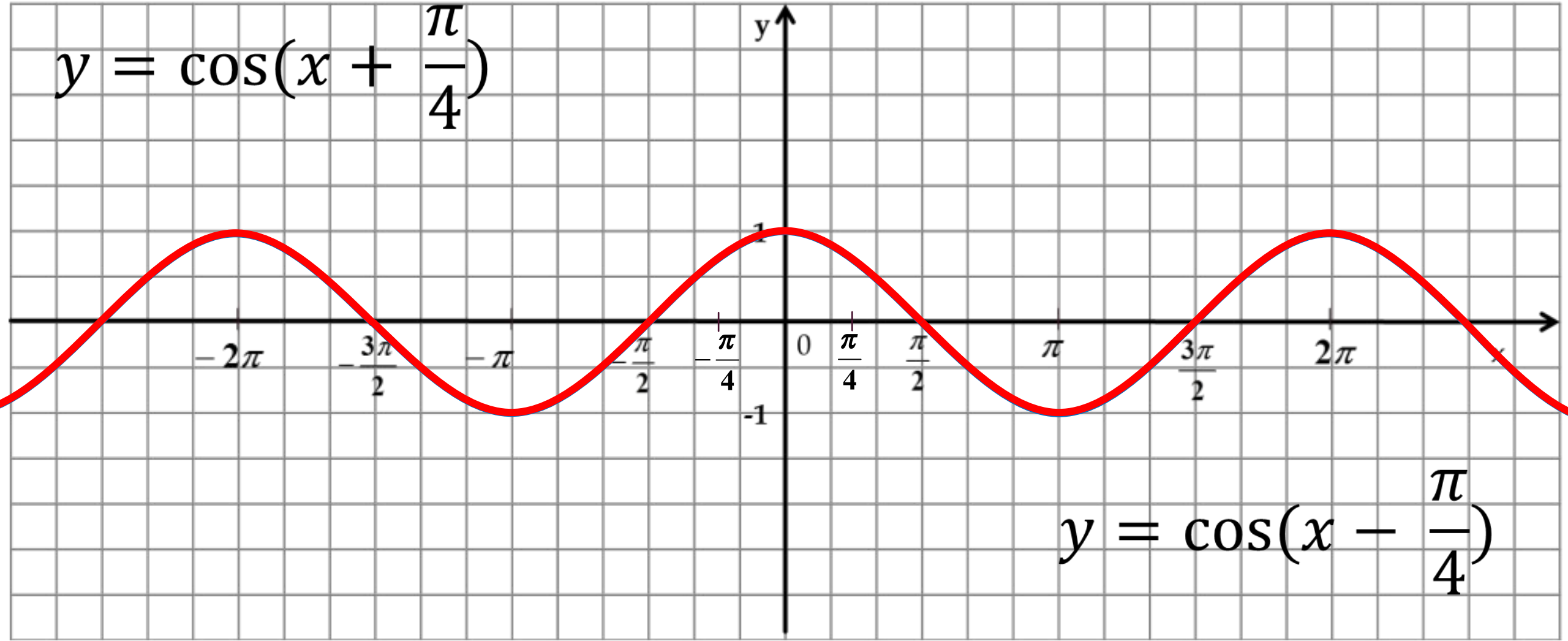
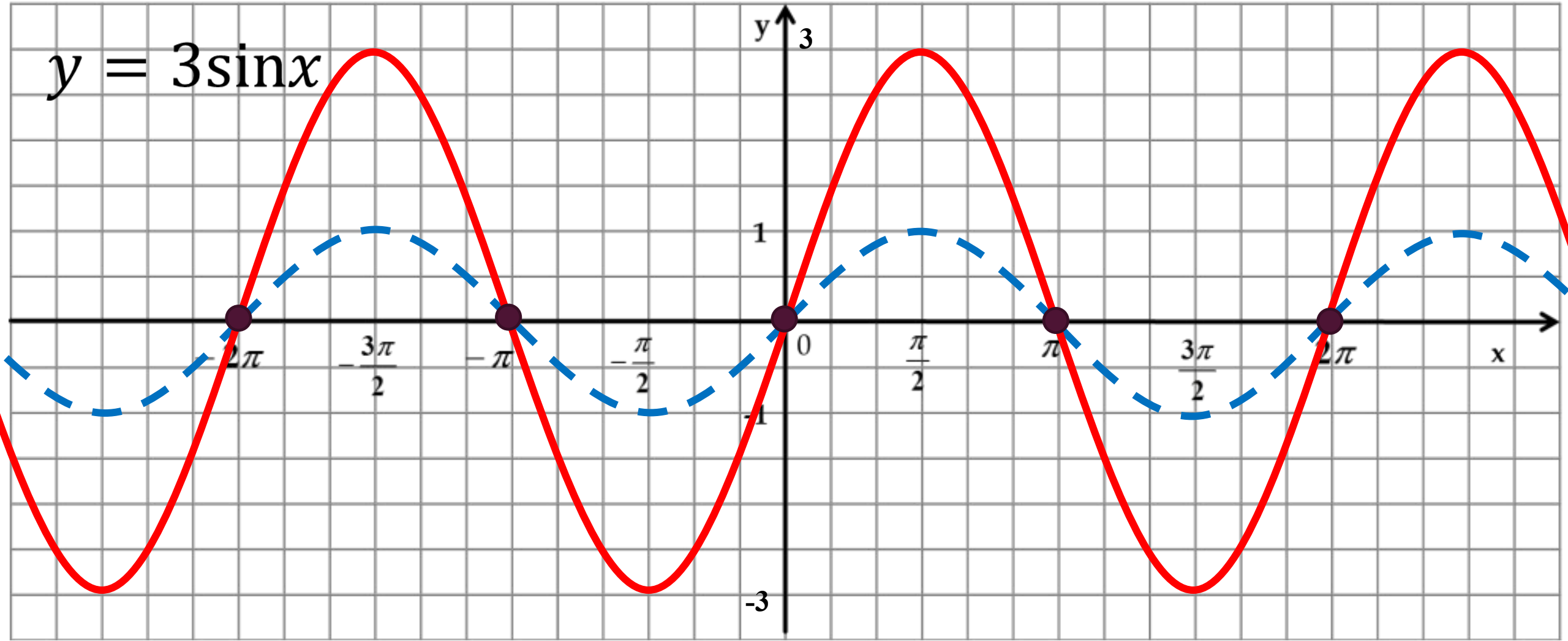
$y = f(x) + b$
Параллельный перенос вдоль оси ординат



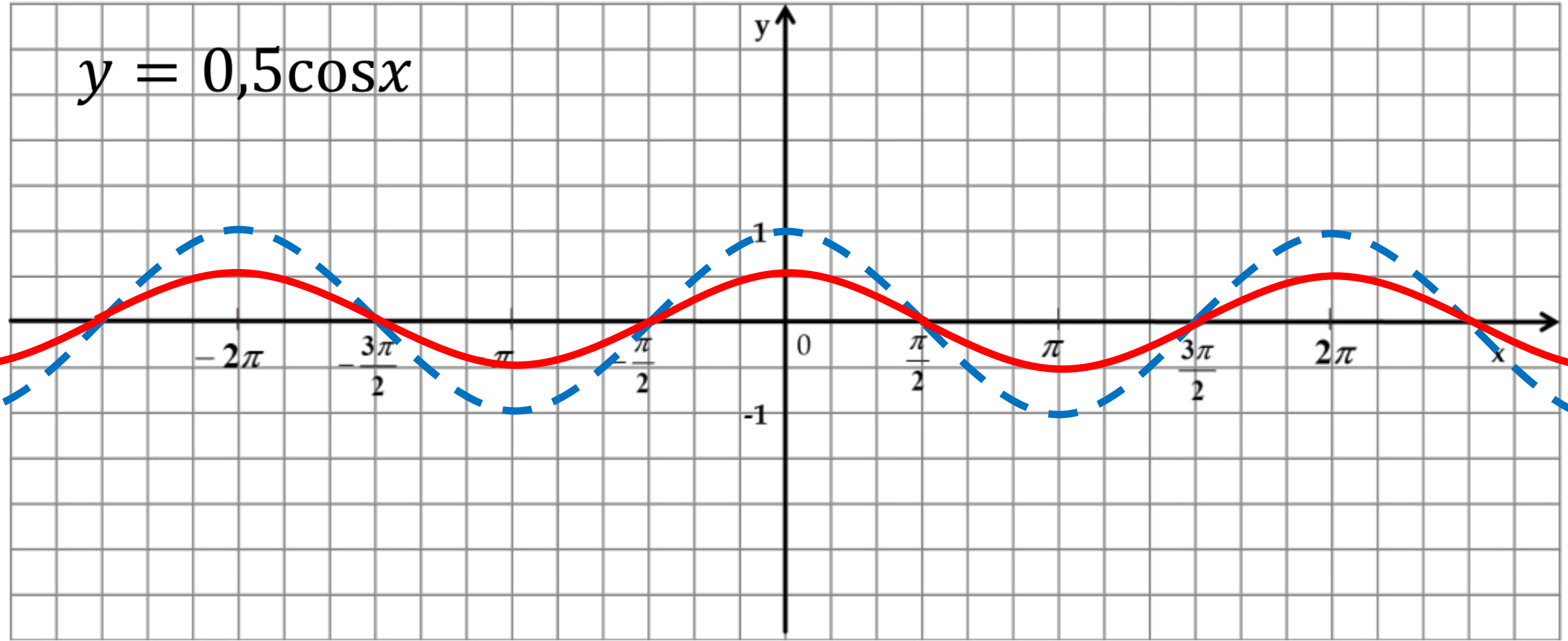
$y = f(x + a)$
Параллельный перенос вдоль оси ординат



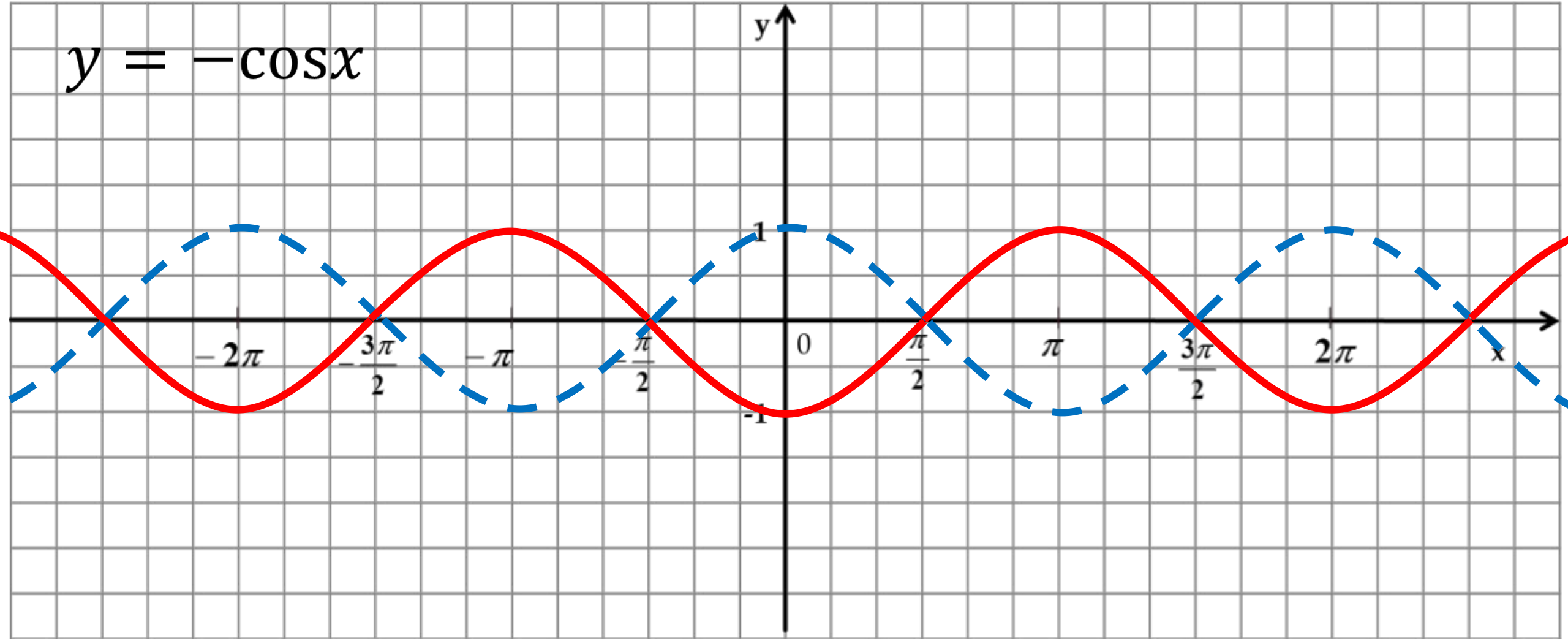
y = m*f*(x), где m>1
Растяжение от оси x с коэффициентом m



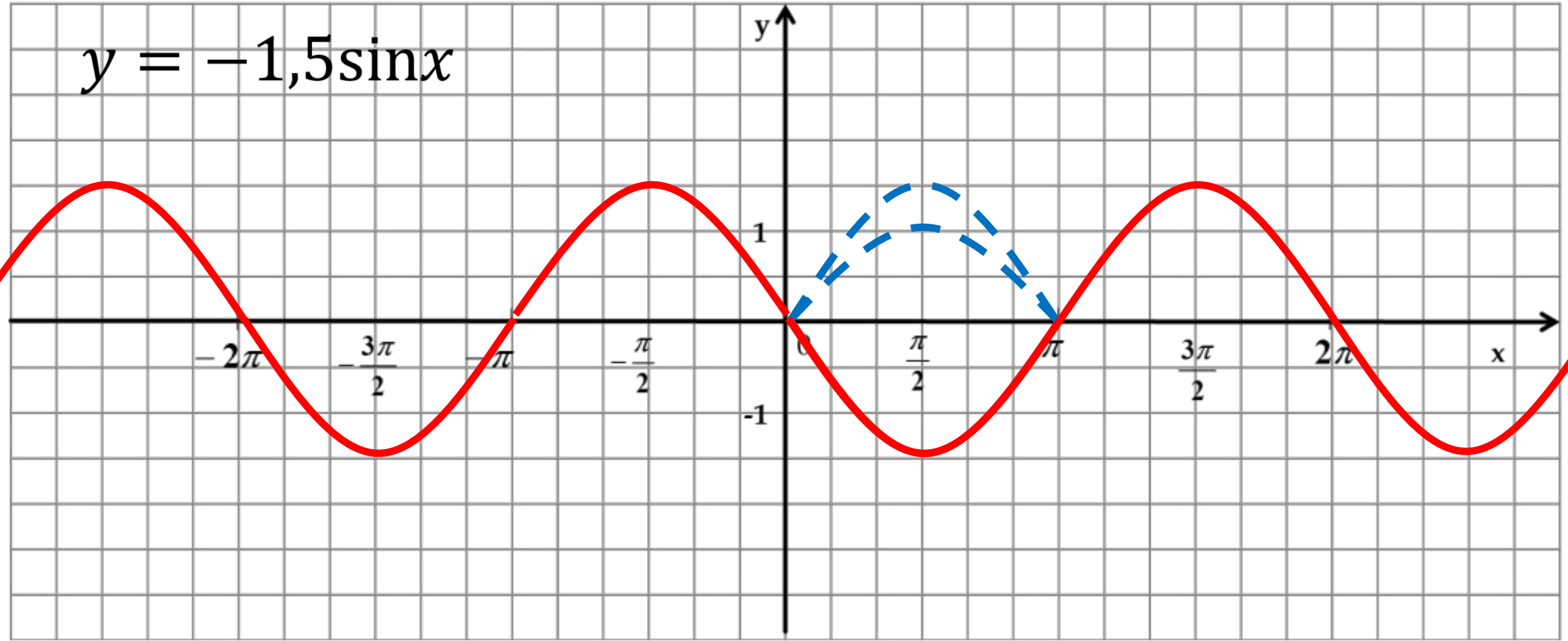
$y = mf(x)$, где $0<m<1$
Сжатие к оси x с коэффициентом $\frac{1}{m}$



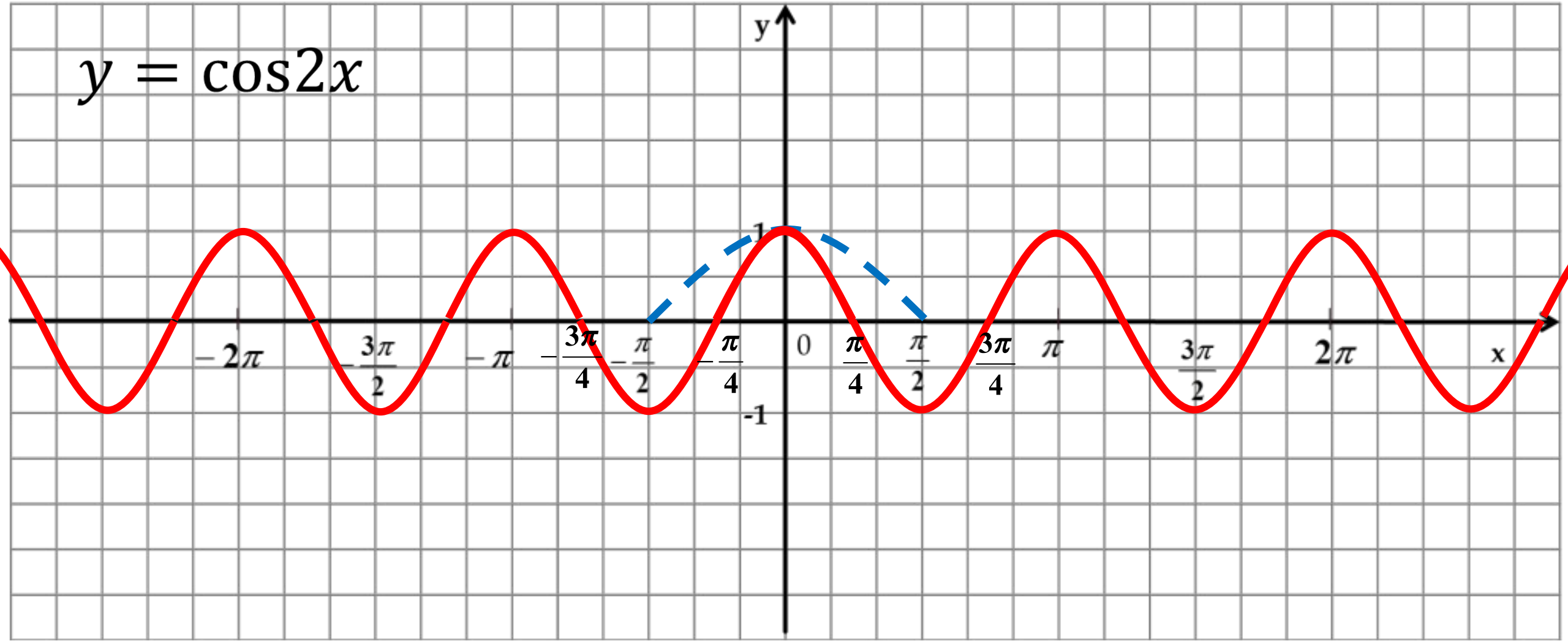
y = m*f*(x), где m=-1
Преобразование симметрии относительно оси x



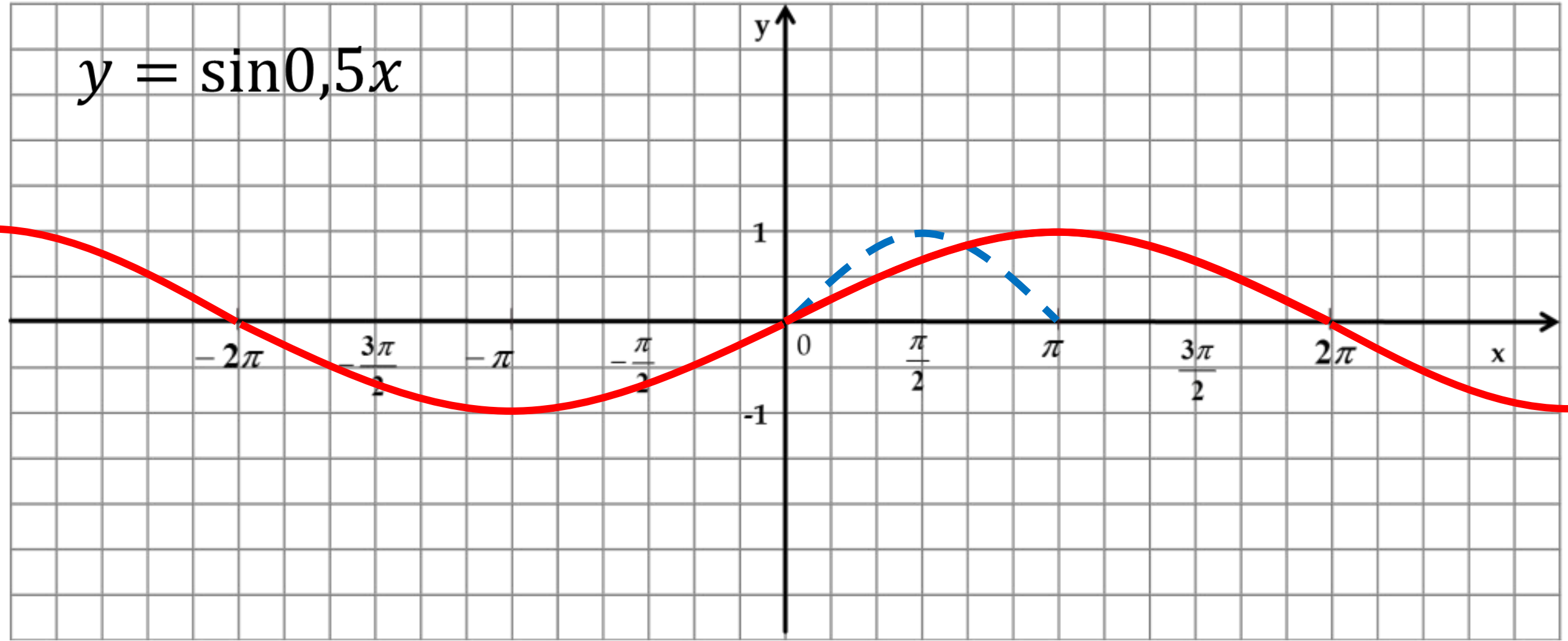
y = m*f*(x), где m<0


$y = -1{,}5\sin x$
y
1
-1
x
-2π
$-\frac{3\pi}{2}$
$-\pi$
$-\frac{\pi}{2}$
0
$\frac{\pi}{2}$
π
$\frac{3\pi}{2}$
2π

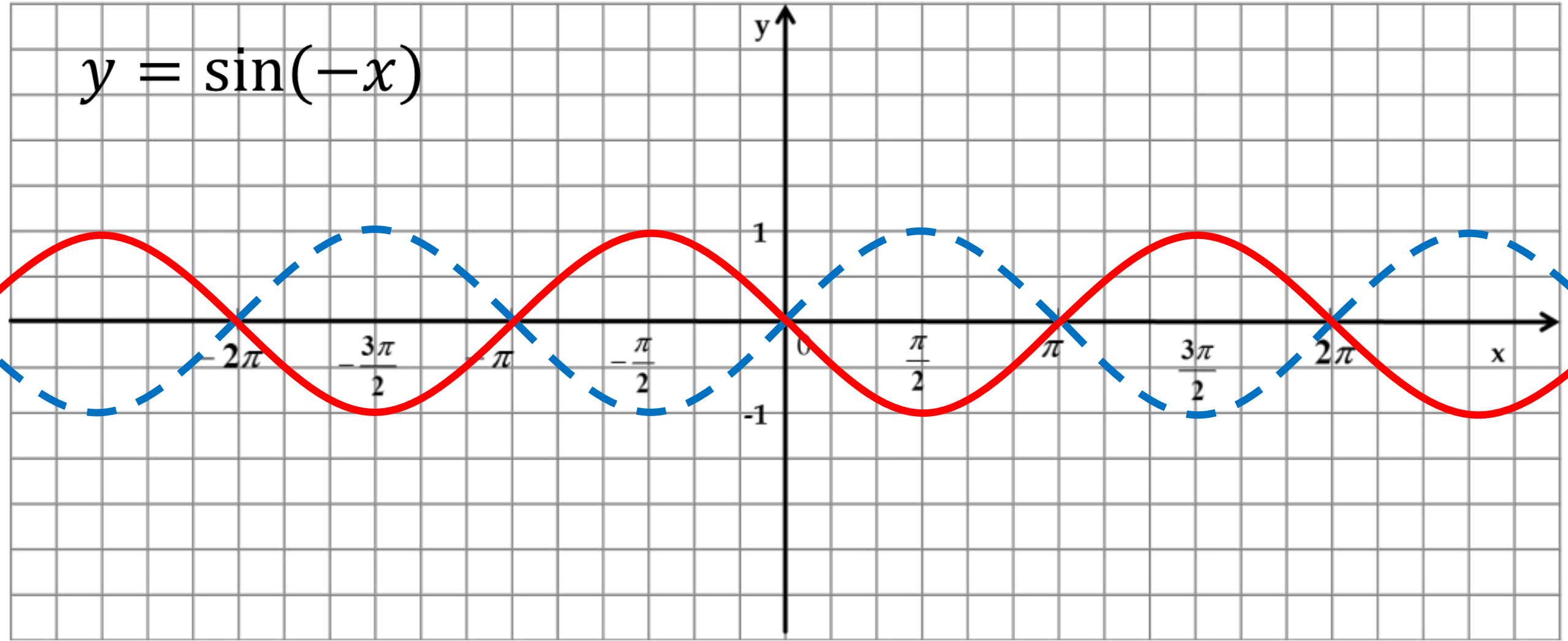
y = f(kx), где k>1
Сжатие к оси y с коэффициентом k



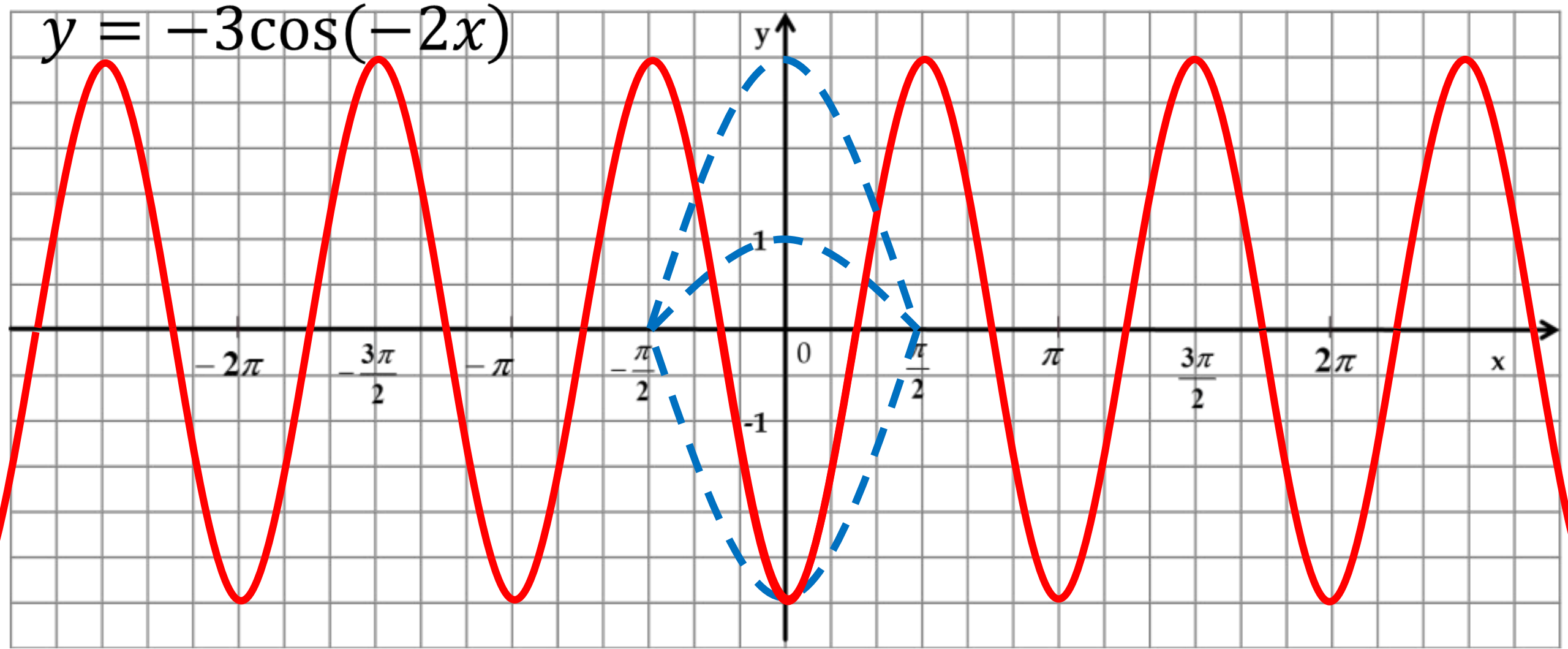
y = f(kx), где 0<k<1
Растяжение от оси y с коэффициентом $\frac{1}{k}$



y = f(kx), где k=-1
Преобразование симметрии относительно оси y

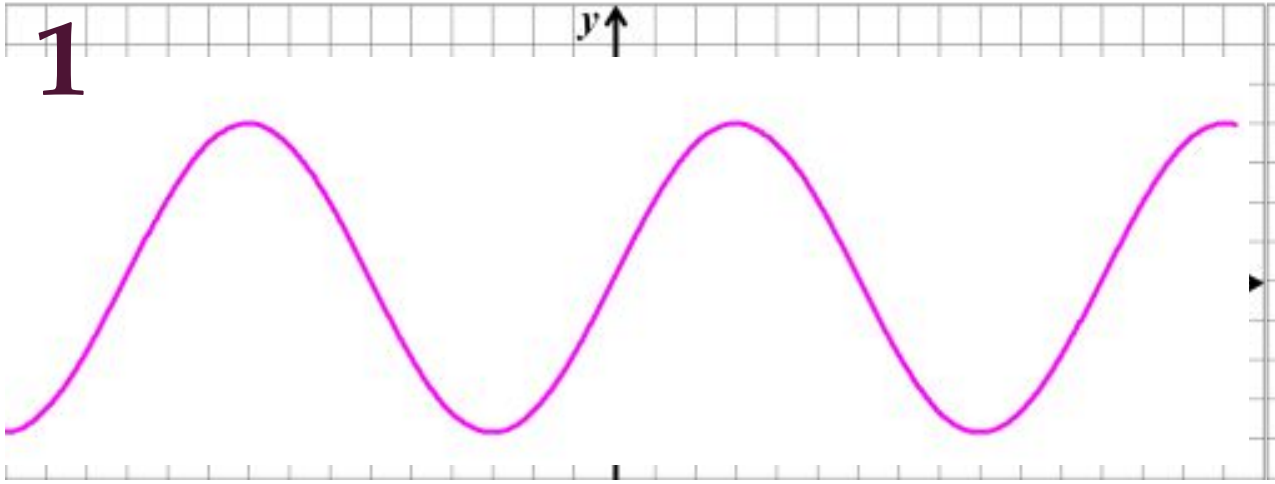


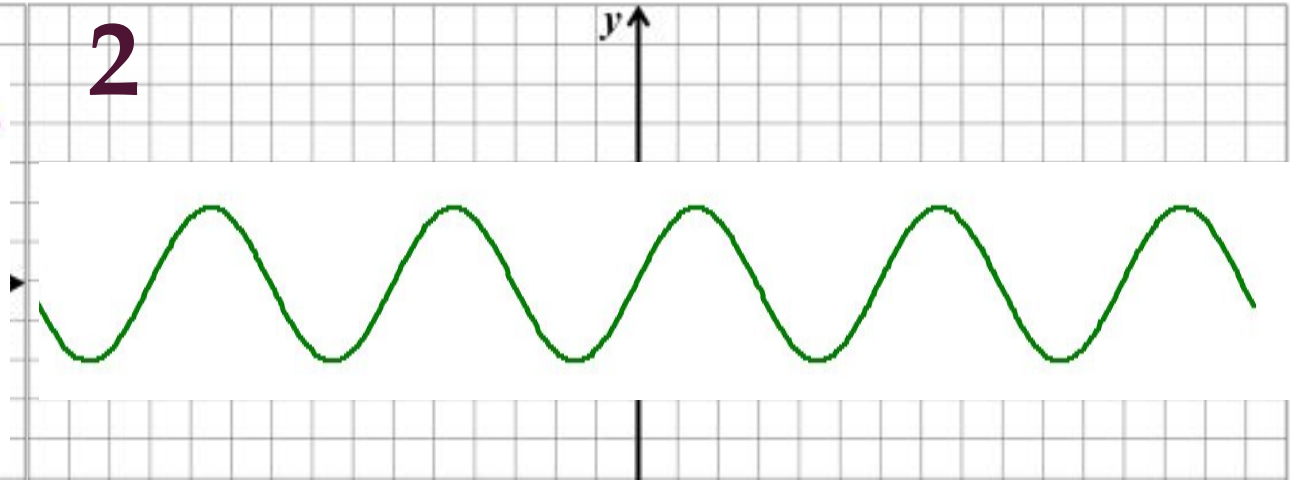
y = f(kx), где k<0

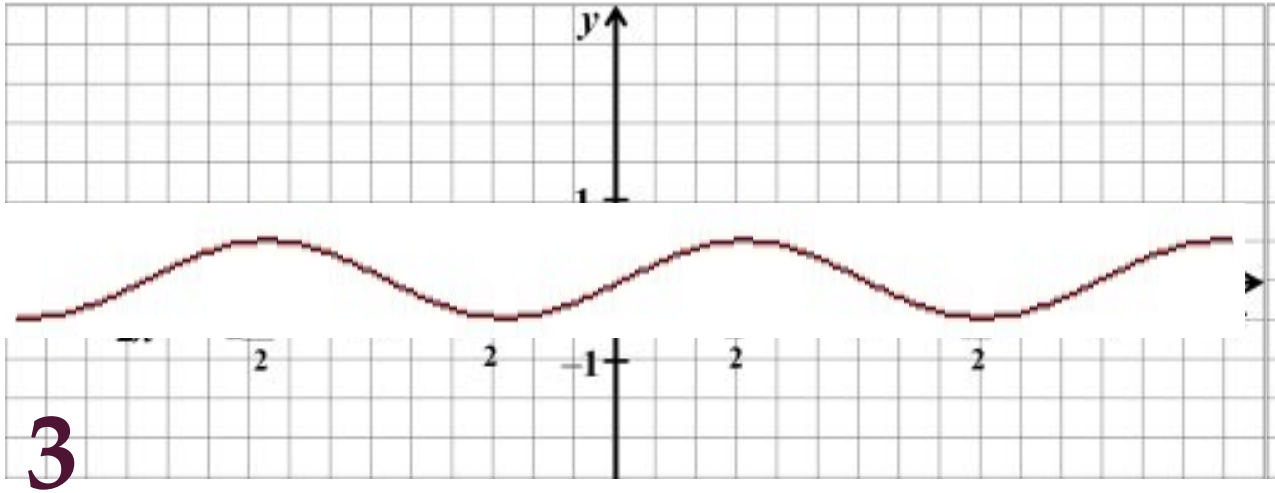

$y = -3\cos(-2x)$
y
1
-1
0
x
-2π
$-\frac{3\pi}{2}$
$-\pi$
$-\frac{\pi}{2}$
$\frac{\pi}{2}$
π
$\frac{3\pi}{2}$
2π

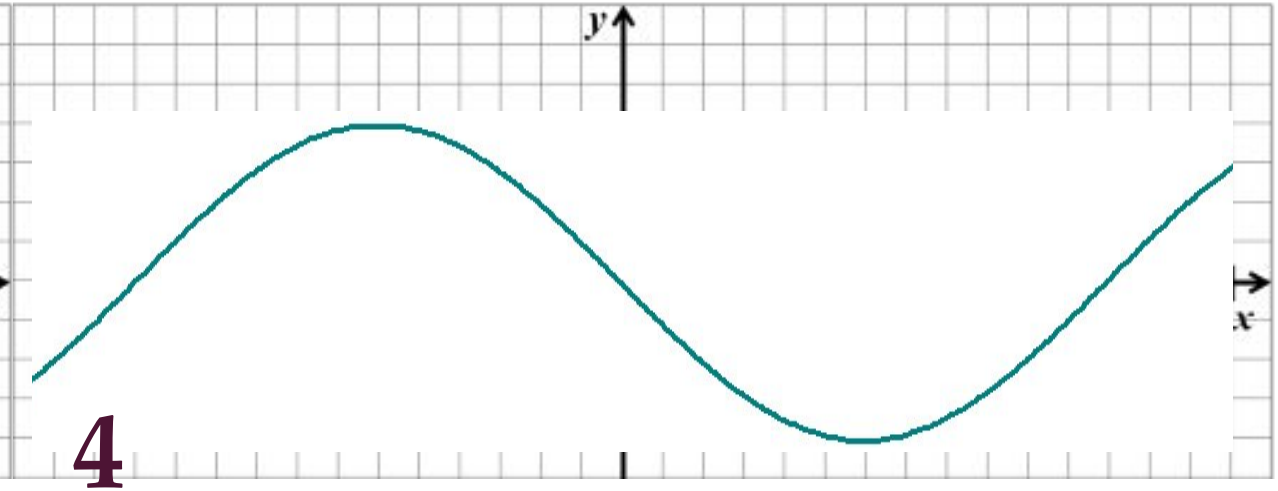
$y = \sin 2x$ $y = \sin 0{,}5x$ $y = 0{,}5\sin x$ $y = 2\sin x$

$y = 2\sin(-0{,}5x)$ $y = -2\sin 2x$ $y = -2\sin 0{,}5x$



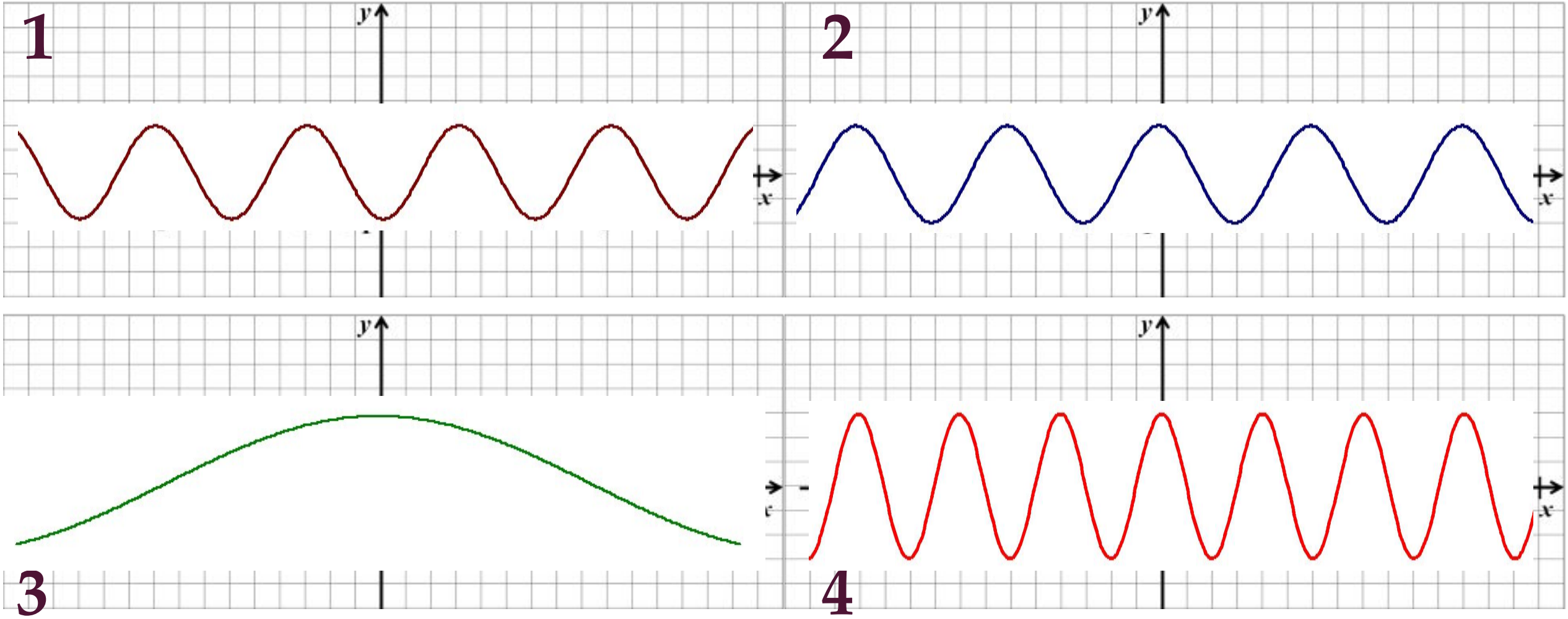






$y = -\cos 2x$ $\quad$ $y = \cos(-2x)$ $\quad$ $y = \cos 2x$ $\quad$ $y = 2\cos x$

$y = 1{,}5\cos\frac{x}{3}$ $\quad$ $y = 1{,}5\cos 3x$ $\quad$ $y = 1{,}5\cos x$



Построить графики функций

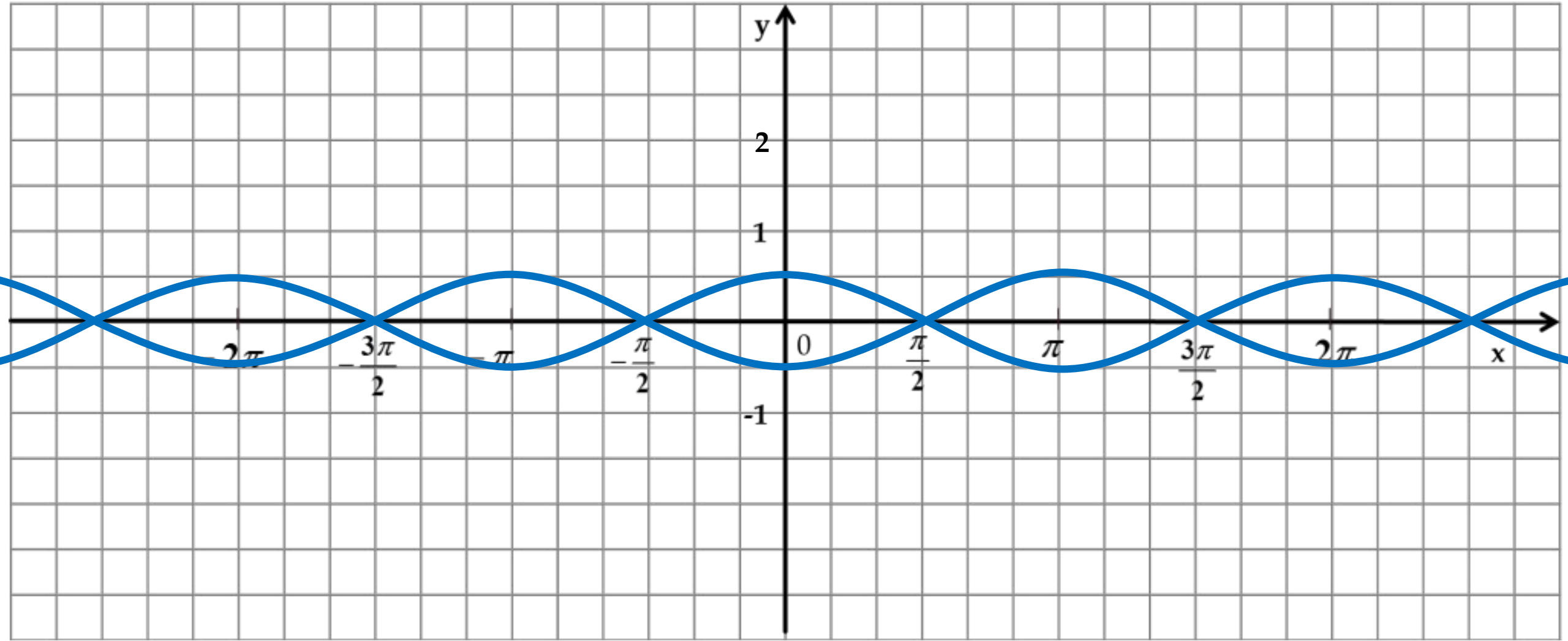
$$y = -\frac{1}{2}\cos x + 2$$

$$y = -3\sin\left(x + \frac{\pi}{6}\right)$$

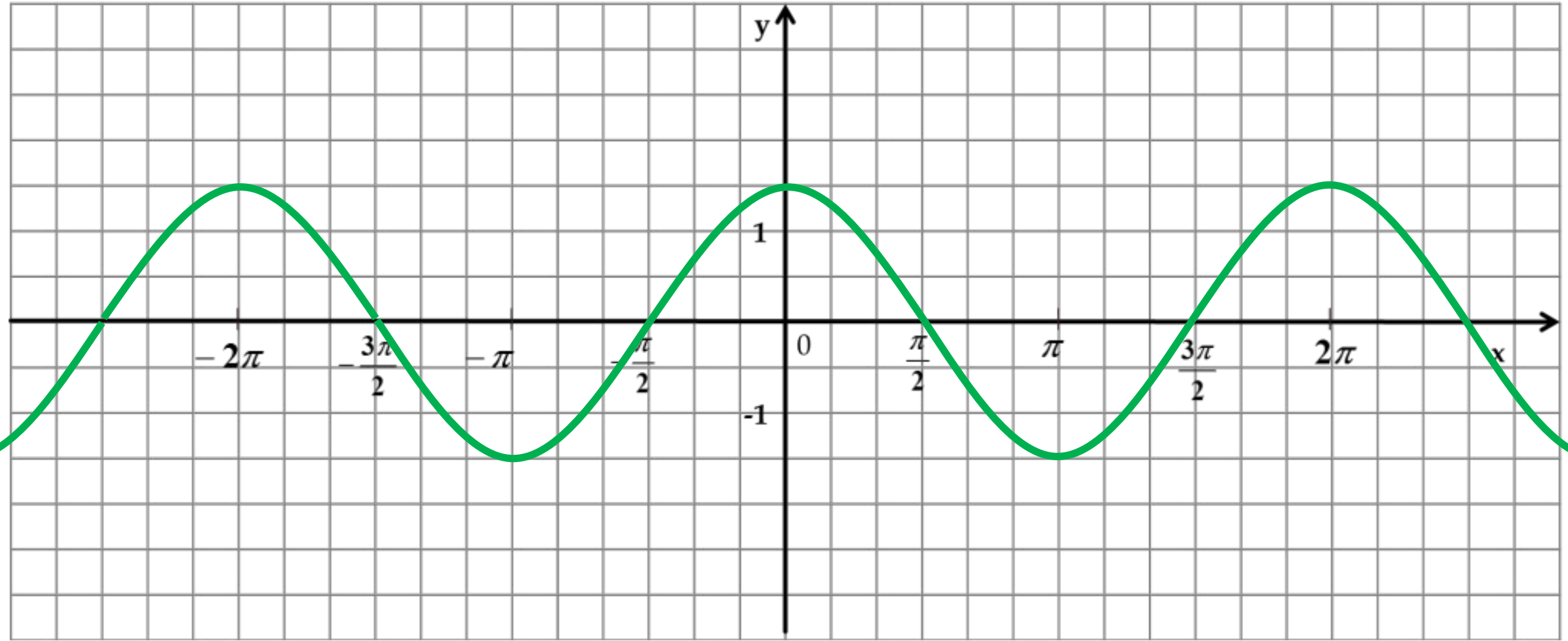
$$y = 1{,}5\cos\left(x - \frac{2\pi}{3}\right)$$

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

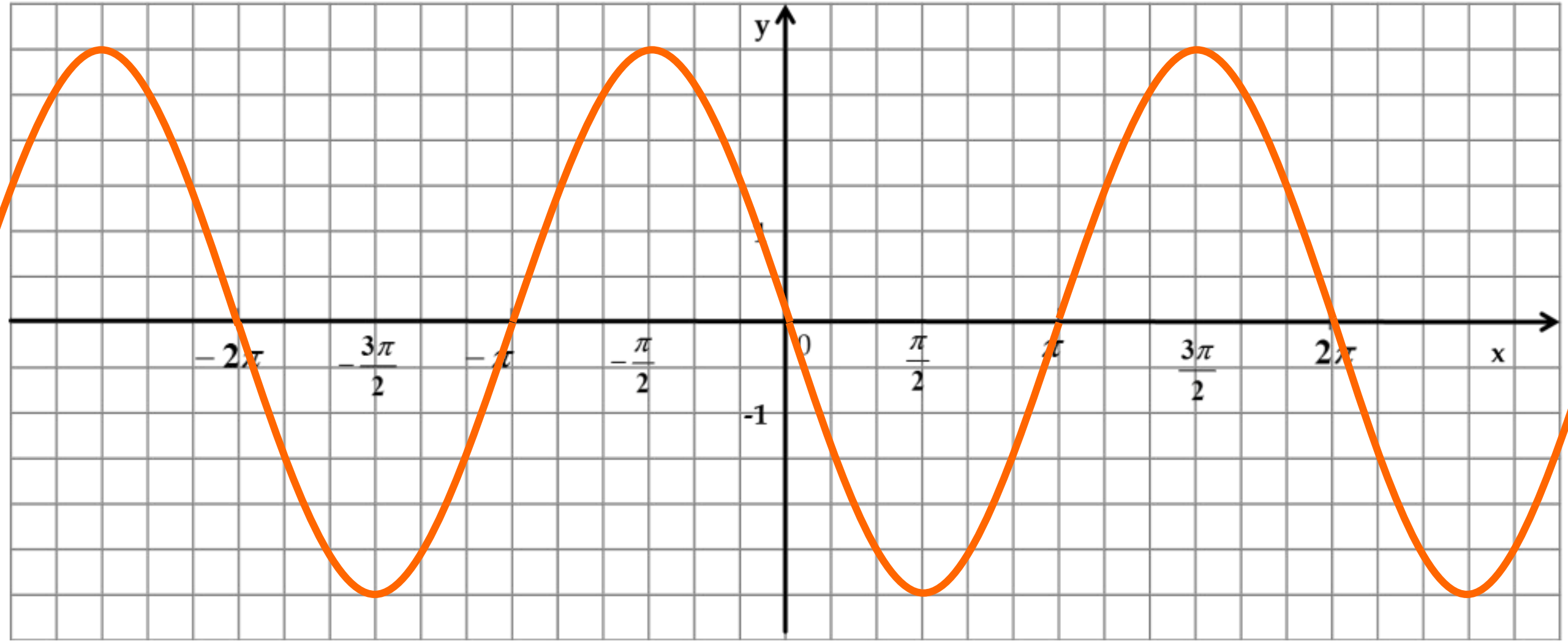
$y = -\frac{1}{2}\cos x + 2$



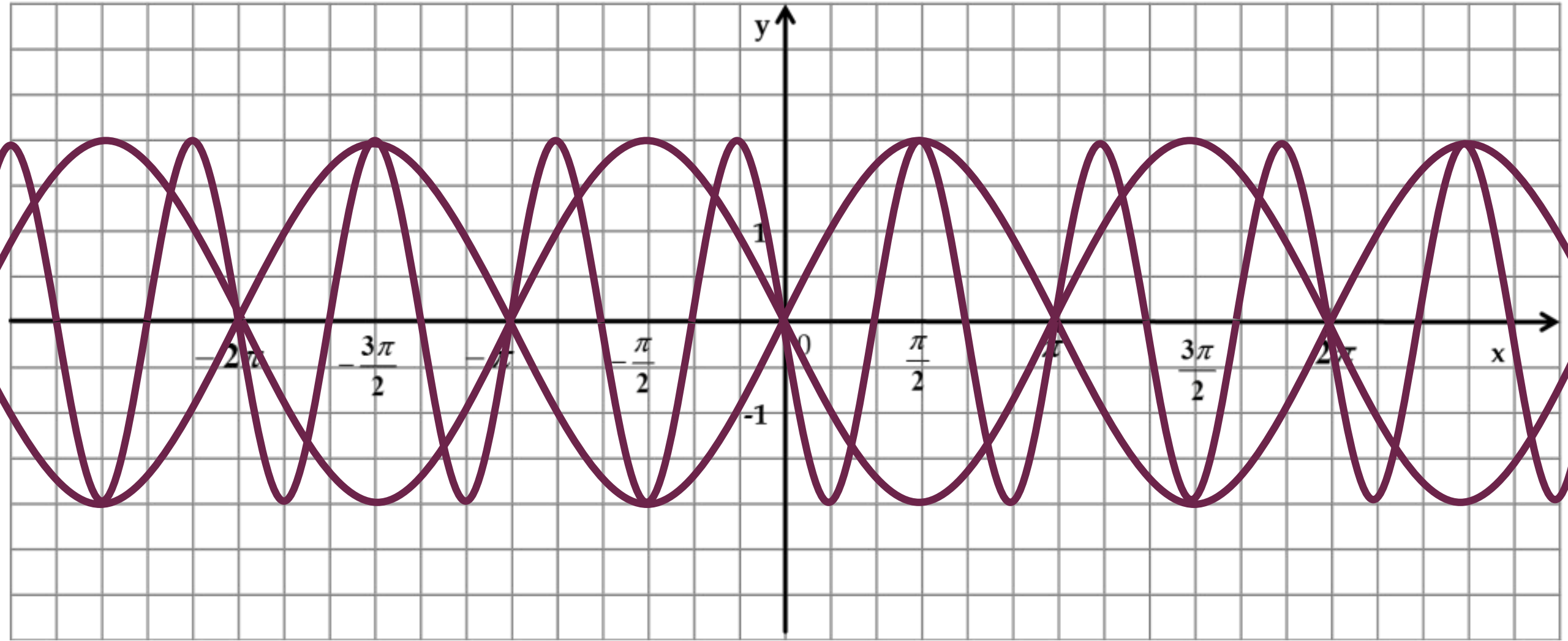
$y = 1{,}5\cos(x - \frac{2\pi}{3})$



$y = -3\sin(x + \frac{\pi}{6})$



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



Самостоятельная работа

Вариант 1

1.Постройте график функции

$$y = -2{,}5\sin x + 0{,}5$$

По графику найдите:

а) область значений функции;
б) промежутки убывания функции.

Вариант 2

1.Постройте график функции

$$y = -0{,}5\cos\left(x + \frac{\pi}{3}\right)$$

По графику найдите:

а) область значений функции;
б) промежутки возрастания функции.

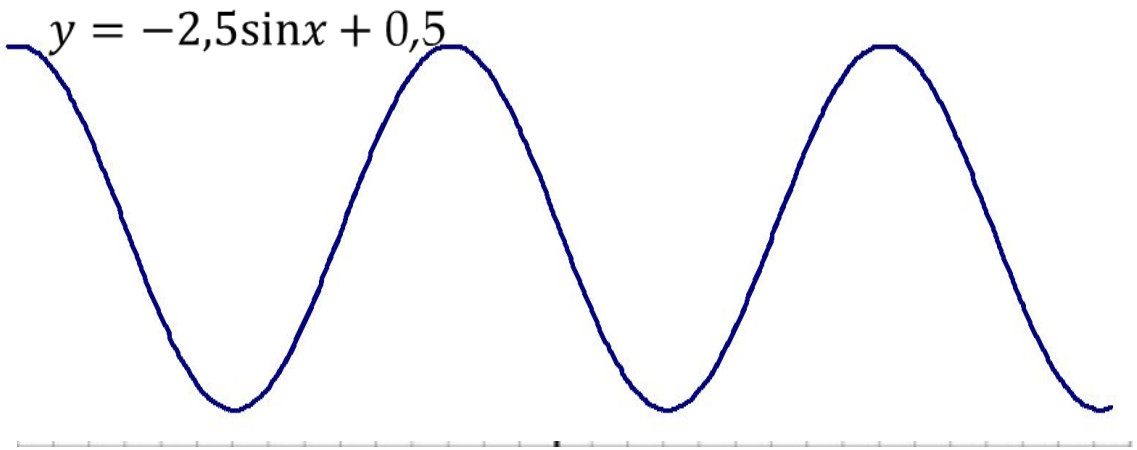
2.Решите графически уравнение

$$\cos\frac{2x}{3} = -1$$

$$\sin\frac{2x}{3} = 1$$

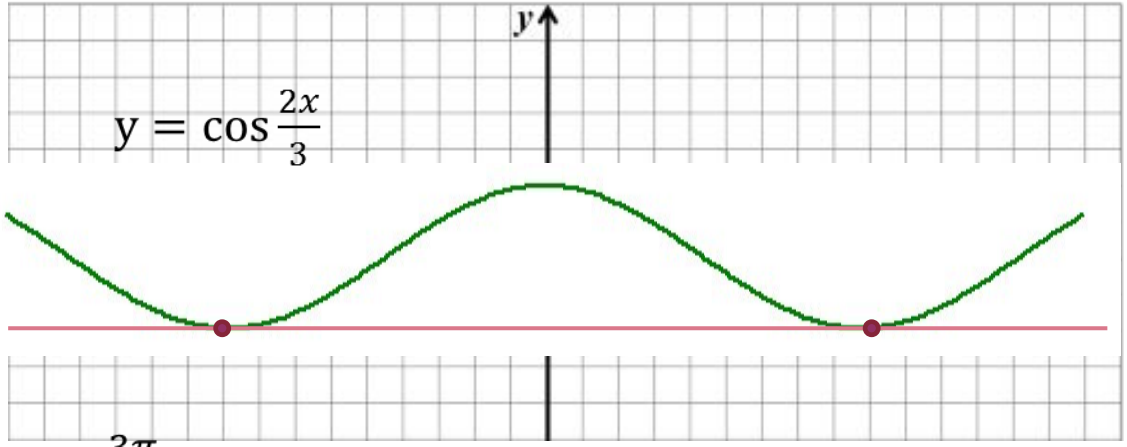
Решение

1 вариант



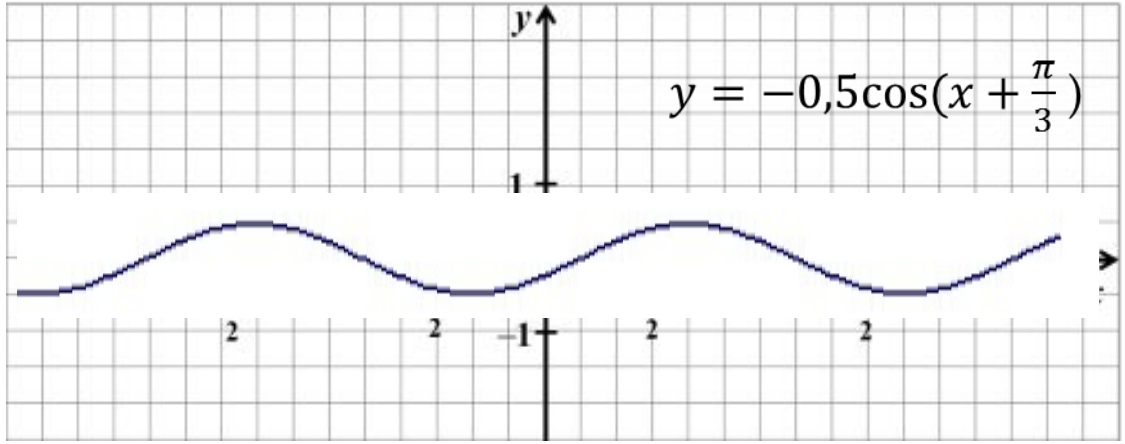
а)E(f)=[-2;3];

б)f(x) убывает на [- $\frac{\pi}{2}$+2πk; $\frac{\pi}{2}$+2πk], k∈Z



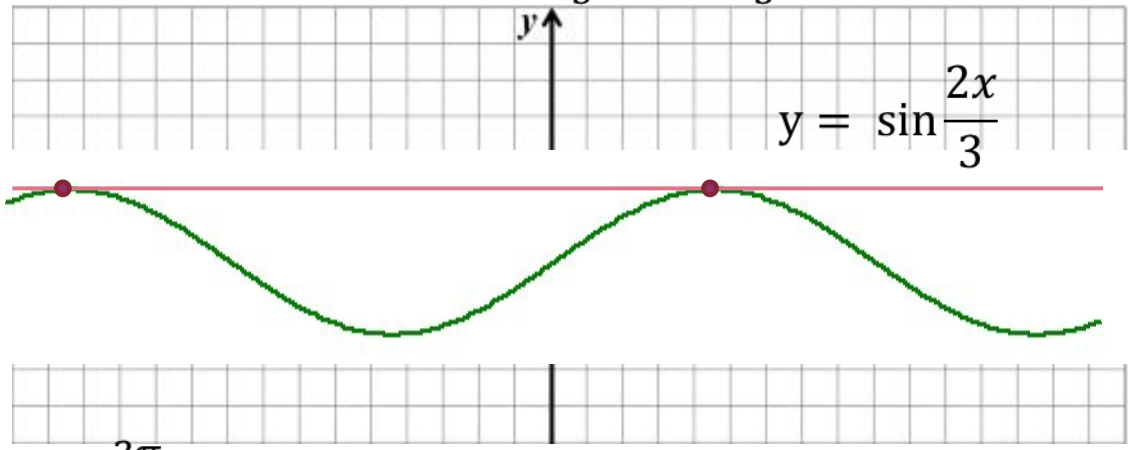
$x = \frac{3\pi}{2} + 3\pi k$, k∈Z

2 вариант



а)E(f)=[-0,5;0,5]

б)f(x) возрастает на [- $\frac{\pi}{3}$+2πk; $\frac{2\pi}{3}$+2πk], k∈Z



$x = \frac{3\pi}{4} + 3\pi k$, k∈Z