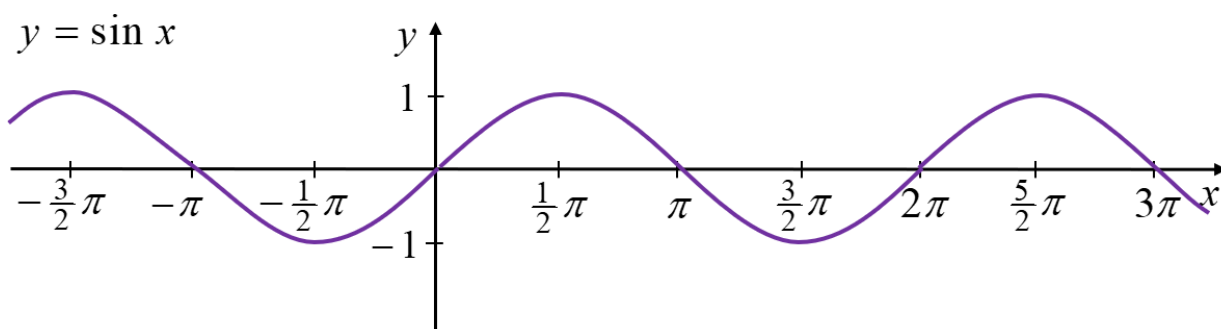


WYKRESY I WŁASNOŚCI FUNKCJI TRYGNOMETRYCZNYCH



Dziedzina: $x \in \mathbb{R}$

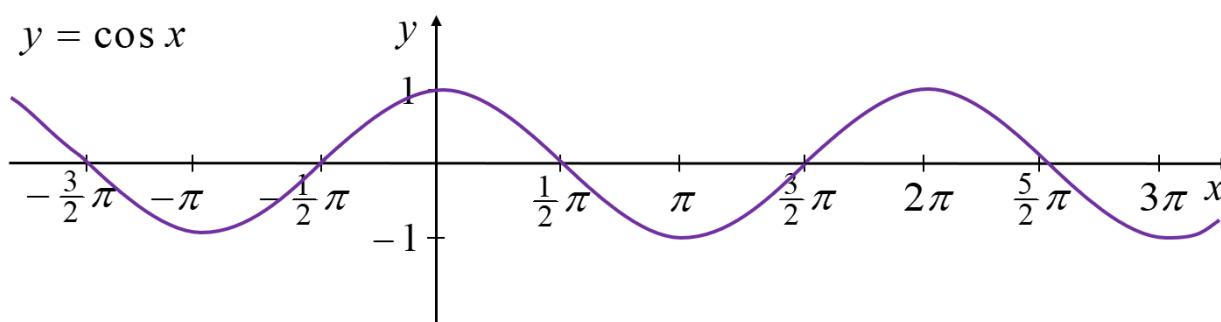
Zbiór wartości: $\sin x \in [-1, 1]$

Miejsca zerowe: $X_0 = \{x : x = k\pi, k \in \mathbb{Z}\}$

Okres podstawowy: $T_0 = 2\pi$

$f_{\max}$ dla $x \in \{x : x = \frac{\pi}{2} + 2k\pi, k \in \mathbb{Z}\}$

$f_{\min}$ dla $x \in \{x : x = \frac{3\pi}{2} + 2k\pi, k \in \mathbb{Z}\}$



Dziedzina: $x \in \mathbb{R}$

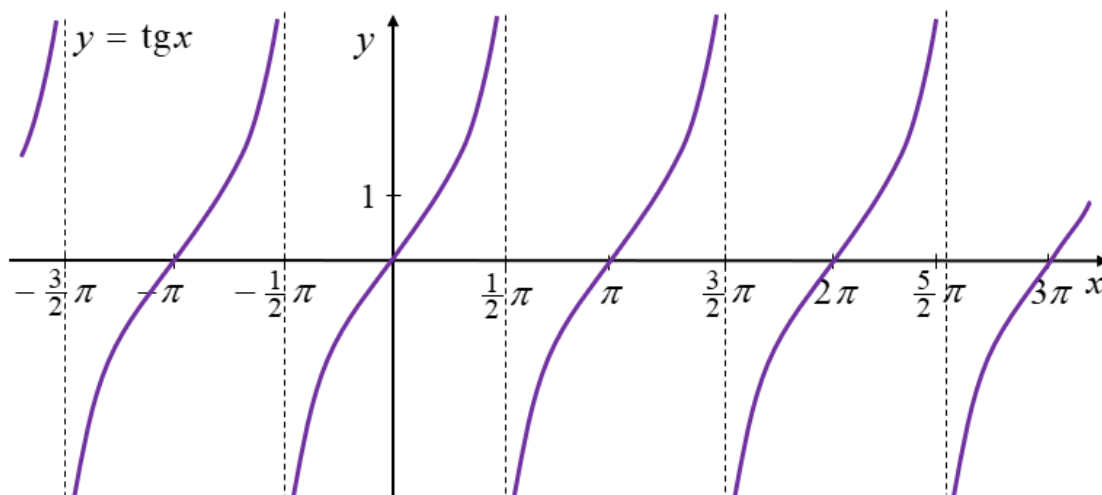
Zbiór wartości: $\cos x \in [-1, 1]$

Miejsca zerowe: $X_0 = \{x : x = \frac{\pi}{2} + k\pi, k \in \mathbb{Z}\}$

Okres podstawowy: $T_0 = 2\pi$

$f_{\max}$ dla $x \in \{x : x = 2k\pi, k \in \mathbb{Z}\}$

$f_{\min}$ dla $x \in \{x : x = \pi + 2k\pi, k \in \mathbb{Z}\}$



Dziedzina: $x \in \mathbb{R} \setminus \left\{x : x = \frac{\pi}{2} + k\pi, k \in \mathbb{Z}\right\}$

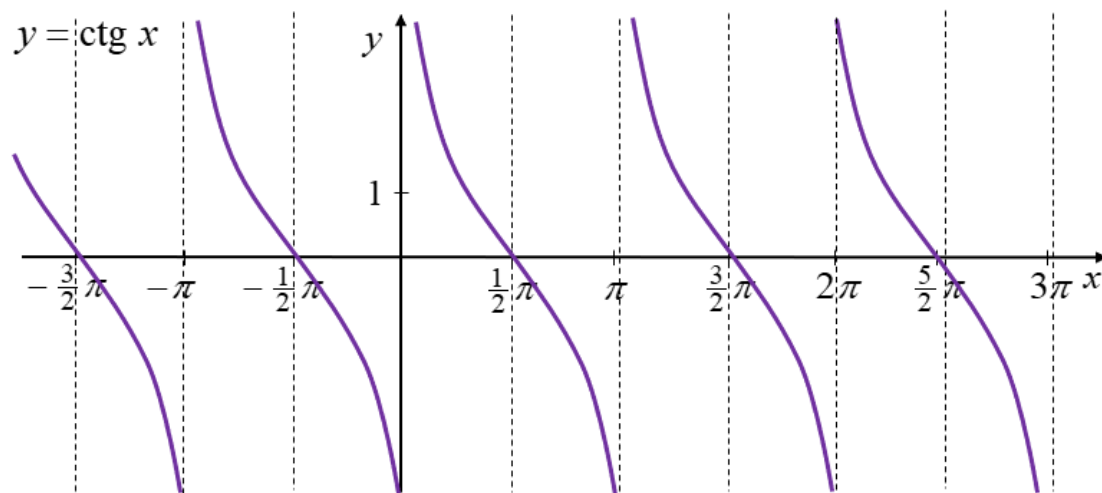
Zbiór wartości: $\text{tg } x \in \mathbb{R}$

Miejsca zerowe: $X_0 = \{x : x = k\pi, k \in \mathbb{Z}\}$

Okres podstawowy: $T_0 = \pi$

$f_{\max}$ – brak

$f_{\min}$ – brak



Dziedzina: $x \in \mathbb{R} \setminus \{x : x = k\pi, k \in \mathbb{Z}\}$

Zbiór wartości: $\text{ctg } x \in \mathbb{R}$

Miejsca zerowe: $X_0 = \left\{x : x = \frac{\pi}{2} + k\pi, k \in \mathbb{Z}\right\}$

Okres podstawowy: $T_0 = \pi$

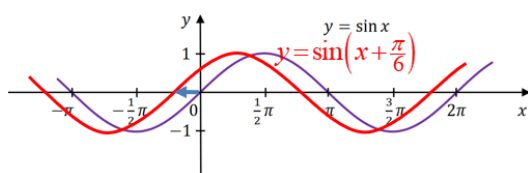
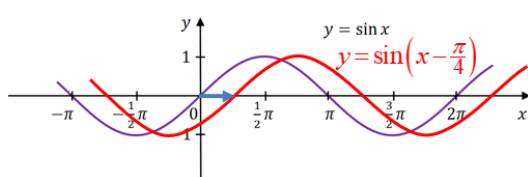
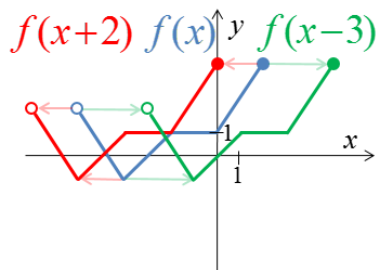
$f_{\max}$ – brak

$f_{\min}$ – brak

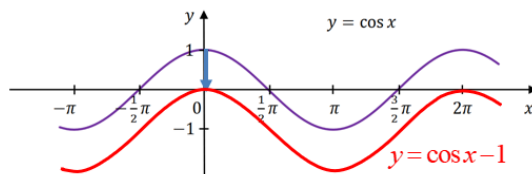
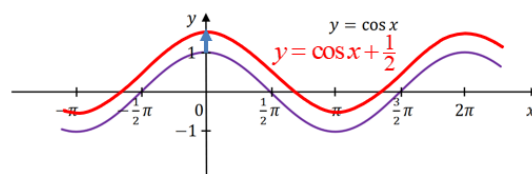
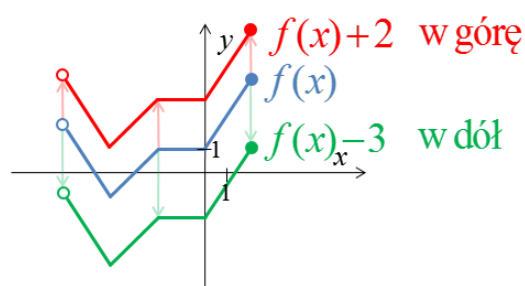
PRZEKSZTAŁCENIA WYKRESU FUNKCJI

Przesunięcie wzdłuż osi OX :

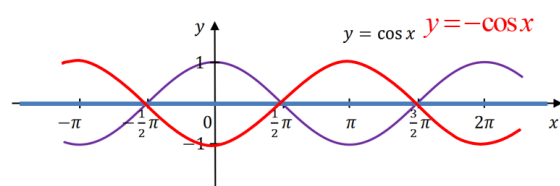
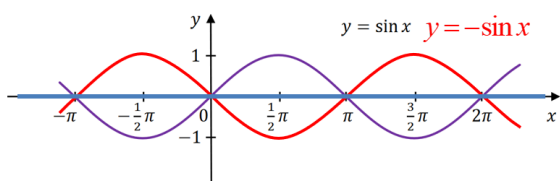
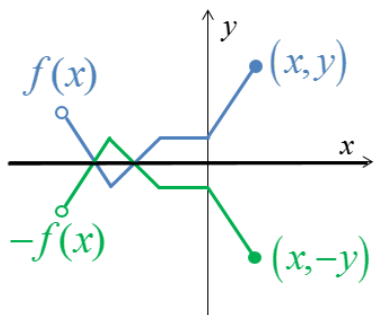
w lewo w prawo



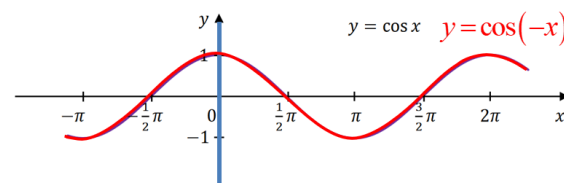
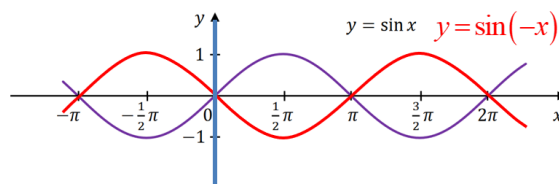
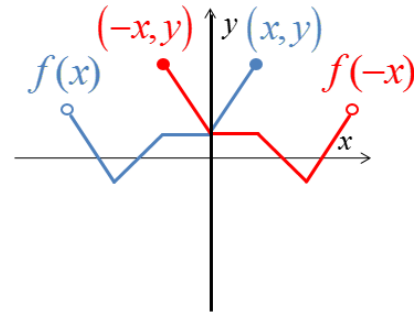
Przesunięcie wzdłuż osi OY :



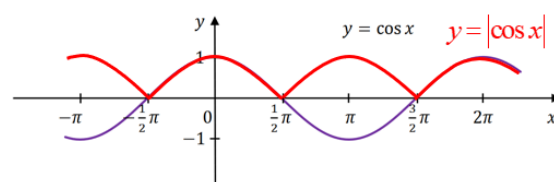
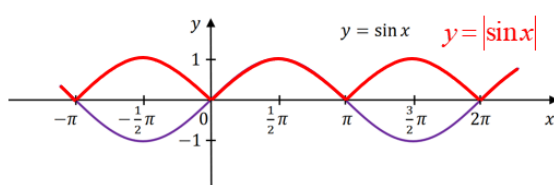
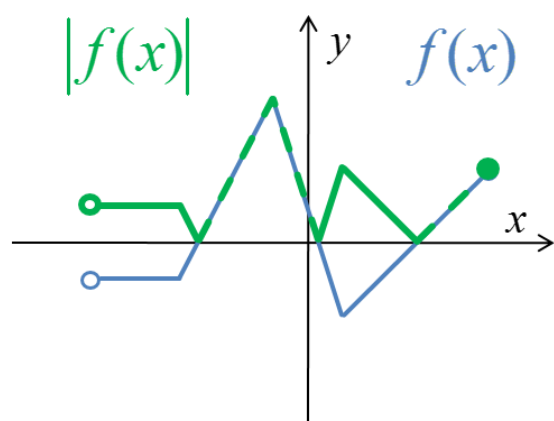
Symetria względem osi OX :



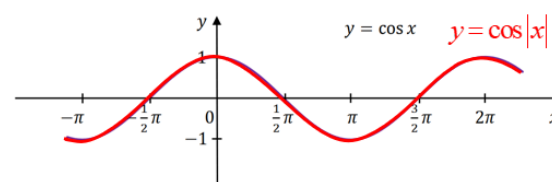
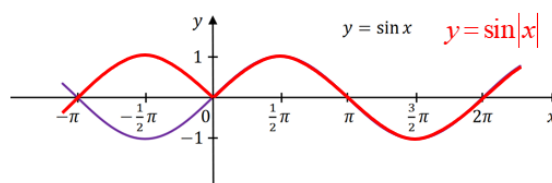
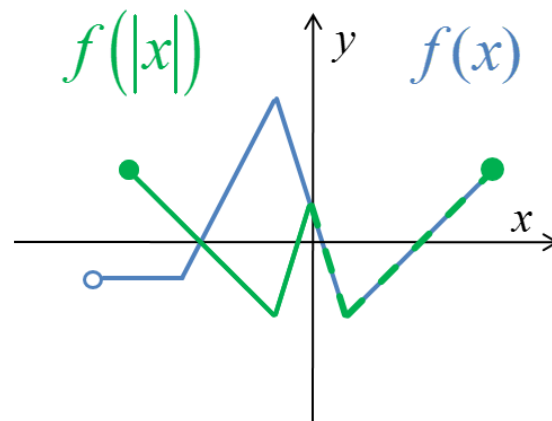
Symetria względem osi OY :



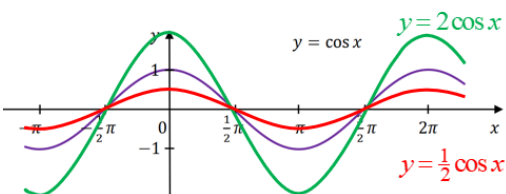
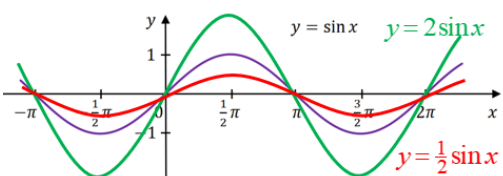
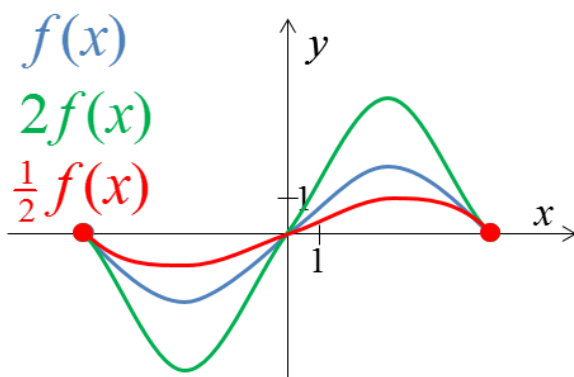
Moduł po wartościach:



Moduł po argumentach:



Skalowanie po wartościach:



Skalowanie po argumentach:

