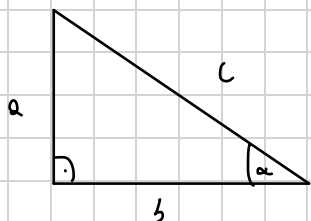


Trygonometria kąta ostrego

1) W trójkącie prostokątnym



$$\sin \alpha = \frac{a}{c}$$

$$\cos \alpha = \frac{b}{c}$$

$$\operatorname{tg} \alpha = \frac{a}{b}$$

$$\operatorname{ctg} \alpha = \frac{b}{a}$$

Podstawowe tożsamości trygonometryczne

$$1) \sin^2 \alpha + \cos^2 \alpha = 1 \quad 3) \operatorname{ctg} \alpha = \frac{\cos \alpha}{\sin \alpha}$$

$$2) \operatorname{tg} \alpha = \frac{\sin \alpha}{\cos \alpha} \quad 4) \operatorname{ctg} \alpha \cdot \operatorname{tg} \alpha = 1$$

Jeżeli $\alpha \in (0, 30^\circ)$ to

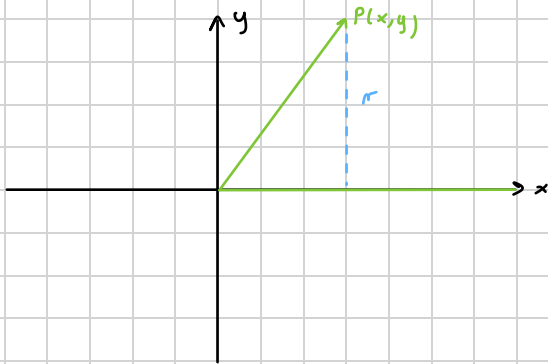
$$1) \sin(30 - \alpha) = \cos \alpha$$

$$2) \cos(30 - \alpha) = \sin \alpha$$

$$3) \operatorname{tg}(30 - \alpha) = \operatorname{ctg} \alpha$$

$$4) \operatorname{ctg} \alpha (30 - \alpha) = \operatorname{tg} \alpha$$

Funkcje trygonometryczne kąta płaskiego



$$\operatorname{tg} \alpha = \frac{y}{x} \quad \operatorname{ctg} \alpha = \frac{x}{y}$$

$$\sin \alpha = \frac{y}{r} \quad \cos \alpha = \frac{x}{r}$$

$$r = \sqrt{x^2 + y^2}$$

Podstawowe tożsamości trygonometryczne

$$1) \quad \sin^2 \alpha + \cos^2 \alpha = 1 \quad \alpha \in \langle 0^\circ, 360^\circ \rangle$$

$$2) \quad \operatorname{tg} \alpha = \frac{\sin \alpha}{\cos \alpha} \quad \alpha \in \langle 0^\circ, 360^\circ \rangle \quad \alpha \neq 90^\circ \quad \alpha \neq 270^\circ$$

$$3) \quad \operatorname{ctg} \alpha = \frac{\cos \alpha}{\sin \alpha} \quad \alpha \in \langle 0^\circ, 360^\circ \rangle \quad \alpha \neq 180^\circ$$

$$4) \quad \operatorname{tg} \alpha \cdot \operatorname{ctg} \alpha = 1 \quad \alpha \in \langle 0^\circ, 360^\circ \rangle \quad \alpha \notin \{90^\circ, 180^\circ, 270^\circ\}$$

Wybrane wzory redukcyjne

$$1) \operatorname{tg}(90^\circ + \alpha) = -\operatorname{ctg} \alpha \quad 3) \sin(90^\circ + \alpha) = \cos \alpha$$

$$2) \operatorname{ctg}(90^\circ + \alpha) = -\operatorname{tg} \alpha \quad 4) \cos(90^\circ + \alpha) = -\sin \alpha$$

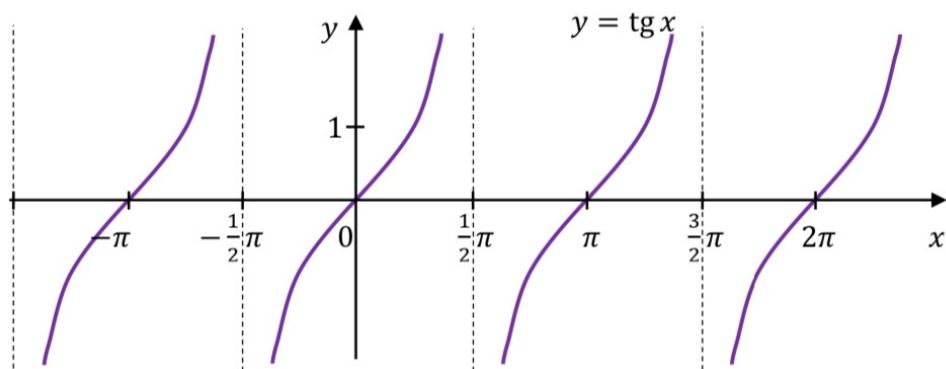
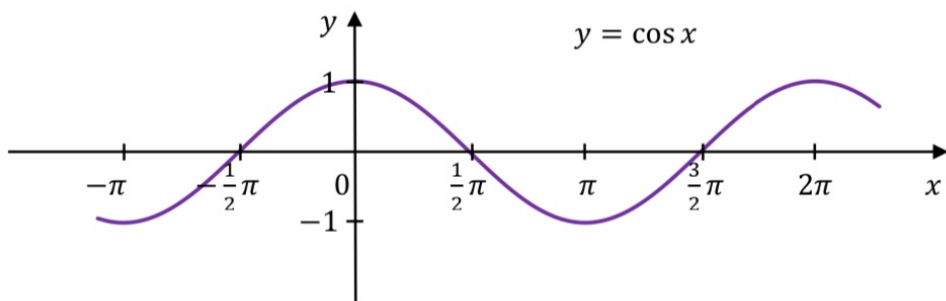
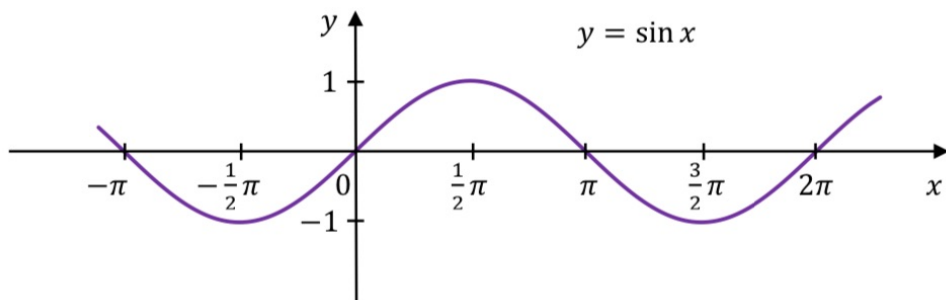
$$1) \operatorname{tg}(180^\circ - \alpha) = -\operatorname{tg} \alpha \quad 3) \sin(180^\circ - \alpha) = \sin \alpha$$

$$2) \operatorname{ctg}(180^\circ - \alpha) = -\operatorname{ctg} \alpha \quad 4) \cos(180^\circ - \alpha) = -\cos \alpha$$

$$1) \operatorname{tg}(180^\circ + \alpha) = \operatorname{tg} \alpha \quad 3) \sin(180^\circ + \alpha) = -\sin \alpha$$

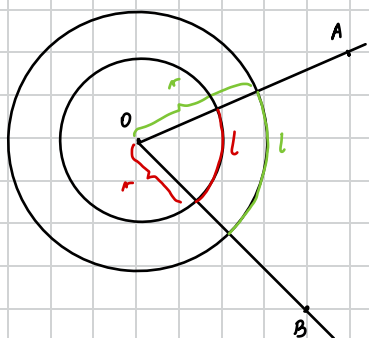
$$2) \operatorname{ctg}(180^\circ + \alpha) = \operatorname{ctg} \alpha \quad 4) \cos(180^\circ + \alpha) = -\cos \alpha$$

Wykresy funkcji trygonometrycznych



Miara łukowa kąta

Miara łukowa kąta to stosunek długości łuku l do promienia okręgu r .



$$\frac{l}{r} = \frac{l}{r}$$

Łąt, którego miara łukowa jest miarą 1 nazywamy radianem.

• Miara łukowa kąta pełnego



$$l = 2\pi r$$

$$\frac{l}{r} = \frac{2\pi r}{r} \text{ rad} = 2\pi \text{ rad}$$

$$1^\circ = \frac{2\pi}{360} = \frac{\pi}{180} (\text{rad})$$

$$t^\circ = \frac{\pi \cdot t}{180} (\text{rad})$$