

## Tangens, Cotangens (4)

### 1. Definice

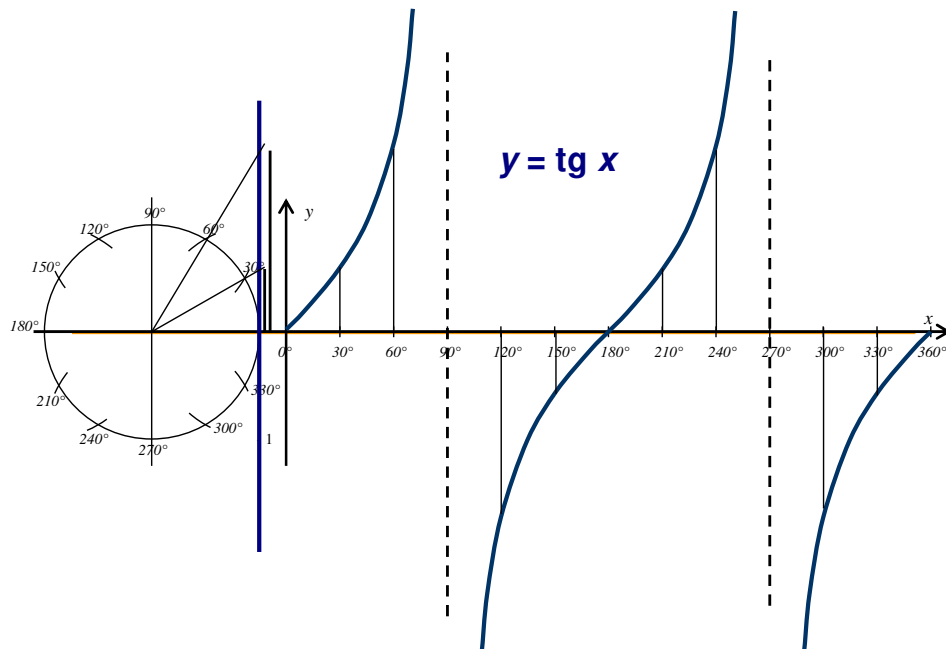
Def: Tangens je definován jako poměr  $tg x = \frac{\sin x}{\cos x}$

Def: Cotangens je definován jako poměr  $cot g x = \frac{\cos x}{\sin x}$

Tabulka funkčních hodnot

$x$	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
$\sin x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$tg x$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	NŘ
$cotg x$	NŘ	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

### 2. Konstrukce funkce $y = tg x$



### 3. Hodnoty $tg x$

1) Určete funkční hodnoty:

$$\begin{aligned} tg 300^\circ &= \\ tg 135^\circ &= \\ tg 30^\circ &= \\ tg 180^\circ &= \\ tg 240^\circ &= \\ tg 300^\circ &= -\sqrt{3} \\ tg 135^\circ &= -1 \\ tg 30^\circ &= \frac{1}{\sqrt{3}} \\ tg 180^\circ &= 0 \\ tg 240^\circ &= \sqrt{3} \end{aligned}$$

2) Určete funkční hodnoty:

$$\begin{aligned} tg 210^\circ &= \\ tg 60^\circ &= \\ tg 330^\circ &= \\ tg 90^\circ &= \\ tg 315^\circ &= \\ tg 210^\circ &= \frac{1}{\sqrt{3}} \\ tg 60^\circ &= \sqrt{3} \\ tg 330^\circ &= -\frac{1}{\sqrt{3}} \\ tg 90^\circ &= \text{NŘ} \\ tg 315^\circ &= -1 \end{aligned}$$

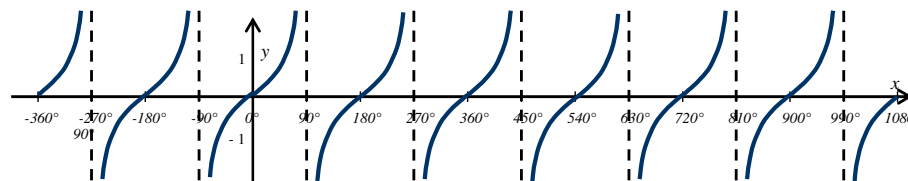
3) Určete funkční hodnoty:

$$\begin{aligned} tg 30^\circ &= \\ tg 0^\circ &= \\ tg 300^\circ &= \\ tg 45^\circ &= \\ tg 150^\circ &= \\ tg 30^\circ &= \frac{1}{\sqrt{3}} \\ tg 0^\circ &= 0 \\ tg 300^\circ &= -\sqrt{3} \\ tg 45^\circ &= 1 \\ tg 150^\circ &= -\frac{1}{\sqrt{3}} \end{aligned}$$

4) Určete funkční hodnoty:

$$\begin{aligned} tg 90^\circ &= \\ tg 270^\circ &= \\ tg 120^\circ &= \\ tg 210^\circ &= \\ tg 225^\circ &= \\ tg 90^\circ &= \text{NŘ} \\ tg 270^\circ &= \text{NŘ} \\ tg 120^\circ &= -\frac{1}{\sqrt{3}} \\ tg 210^\circ &= \frac{1}{\sqrt{3}} \\ tg 225^\circ &= 1 \end{aligned}$$

### 4. Vlastnosti funkce $y = tg x$



### 5. Hodnoty $tg x$ - posunuté

1) Určete funkční hodnoty:

$$\begin{aligned} tg 855^\circ &= \\ tg (-1410^\circ) &= \\ tg 540^\circ &= \\ tg 1320^\circ &= \\ tg (855^\circ - 720^\circ) &= tg 135^\circ = -1 \\ tg (-1410^\circ + 1440^\circ) &= tg 30^\circ = \frac{1}{\sqrt{3}} \\ tg (540^\circ - 360^\circ) &= tg 180^\circ = 0 \\ tg (1320^\circ - 1080^\circ) &= tg 240^\circ = \sqrt{3} \end{aligned}$$

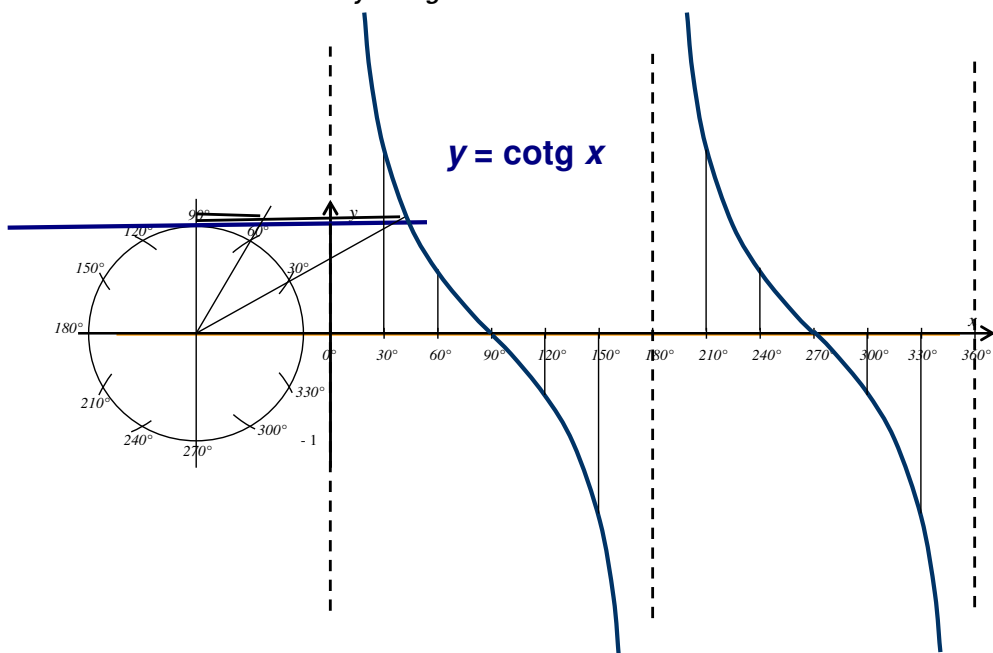
2) Určete funkční hodnoty:

$$\begin{aligned} tg (-1020^\circ) &= \\ tg 690^\circ &= \\ tg 810^\circ &= \\ tg 1755^\circ &= \\ tg (-1020^\circ + 1080^\circ) &= tg 60^\circ = \sqrt{3} \\ tg (690^\circ - 360^\circ) &= tg 330^\circ = -\frac{1}{\sqrt{3}} \\ tg (810^\circ - 720^\circ) &= tg 90^\circ = \text{NŘ} \\ tg (1755^\circ - 1440^\circ) &= tg 315^\circ = -1 \end{aligned}$$

3) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{tg} 720^\circ &= \\ \operatorname{tg} 1770^\circ &= \\ \operatorname{tg} (-1035^\circ) &= \\ \operatorname{tg} 480^\circ &= \\ \operatorname{tg} (720^\circ - 720^\circ) &= \operatorname{tg} 0^\circ = 0 \\ \operatorname{tg} (1770^\circ - 1440^\circ) &= \operatorname{tg} 300^\circ = -\frac{1}{\sqrt{3}} \\ \operatorname{tg} (-1035^\circ + 1080^\circ) &= \operatorname{tg} 45^\circ = 1 \\ \operatorname{tg} (480^\circ - 360^\circ) &= \operatorname{tg} 120^\circ = -\sqrt{3} \end{aligned}$$

### 6. Konstrukce funkce $y = \operatorname{cotg} x$



### 7. Hodnoty $\operatorname{cotg} x$

1) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} 45^\circ &= \\ \operatorname{cotg} 135^\circ &= \\ \operatorname{cotg} 30^\circ &= \\ \operatorname{cotg} 180^\circ &= \\ \operatorname{cotg} 240^\circ &= \\ \operatorname{cotg} 45^\circ &= 1 \\ \operatorname{cotg} 135^\circ &= -1 \\ \operatorname{cotg} 30^\circ &= \sqrt{3} \\ \operatorname{cotg} 180^\circ &= \text{NŘ} \\ \operatorname{cotg} 240^\circ &= \frac{1}{\sqrt{3}} \end{aligned}$$

4) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{tg} 1350^\circ &= \\ \operatorname{tg} (-60^\circ) &= \\ \operatorname{tg} 1650^\circ &= \\ \operatorname{tg} 945^\circ &= \\ \operatorname{tg} (1350^\circ - 1080^\circ) &= \operatorname{tg} 270^\circ = \text{NŘ} \\ \operatorname{tg} (-60^\circ + 360^\circ) &= \operatorname{tg} 300^\circ = -\sqrt{3} \\ \operatorname{tg} (1650^\circ - 1440^\circ) &= \operatorname{tg} 210^\circ = \frac{1}{\sqrt{3}} \\ \operatorname{tg} (945^\circ - 720^\circ) &= \operatorname{tg} 225^\circ = 1 \end{aligned}$$

2) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} 300^\circ &= \\ \operatorname{cotg} 60^\circ &= \\ \operatorname{cotg} 330^\circ &= \\ \operatorname{cotg} 90^\circ &= \\ \operatorname{cotg} 315^\circ &= \\ \operatorname{cotg} 300^\circ &= -\frac{1}{\sqrt{3}} \\ \operatorname{cotg} 60^\circ &= \frac{1}{\sqrt{3}} \\ \operatorname{cotg} 330^\circ &= -\sqrt{3} \\ \operatorname{cotg} 90^\circ &= 0 \\ \operatorname{cotg} 315^\circ &= -1 \end{aligned}$$

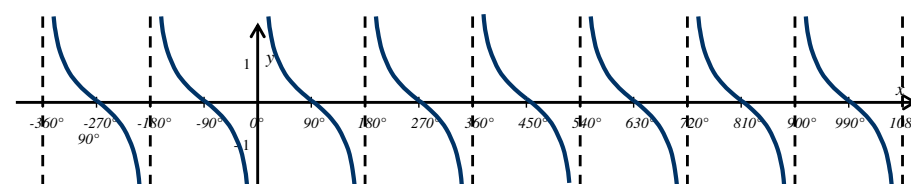
3) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} 240^\circ &= \\ \operatorname{cotg} 0^\circ &= \\ \operatorname{cotg} 330^\circ &= \\ \operatorname{cotg} 45^\circ &= \\ \operatorname{cotg} 120^\circ &= \\ \operatorname{cotg} 240^\circ &= \frac{1}{\sqrt{3}} \\ \operatorname{cotg} 0^\circ &= \text{NŘ} \\ \operatorname{cotg} 330^\circ &= -\sqrt{3} \\ \operatorname{cotg} 45^\circ &= 1 \\ \operatorname{cotg} 120^\circ &= -\frac{1}{\sqrt{3}} \end{aligned}$$

4) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} 330^\circ &= \\ \operatorname{cotg} 270^\circ &= \\ \operatorname{cotg} 300^\circ &= \\ \operatorname{cotg} 210^\circ &= \\ \operatorname{cotg} 225^\circ &= \\ \operatorname{cotg} 270^\circ &= 0 \\ \operatorname{cotg} 330^\circ &= -\sqrt{3} \\ \operatorname{cotg} 300^\circ &= -\frac{1}{\sqrt{3}} \\ \operatorname{cotg} 210^\circ &= \sqrt{3} \\ \operatorname{cotg} 225^\circ &= 1 \end{aligned}$$

### 8. Vlastnosti funkce $y = \operatorname{cotg} x$



### 9. Hodnoty $\operatorname{cotg} x$ - posunuté

1) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} 855^\circ &= \\ \operatorname{cotg} (-1410^\circ) &= \\ \operatorname{cotg} 540^\circ &= \\ \operatorname{cotg} 1320^\circ &= \\ \operatorname{cotg} (855^\circ - 720^\circ) &= \operatorname{cotg} 135^\circ = -1 \\ \operatorname{cotg} (-1410^\circ + 1440^\circ) &= \operatorname{cotg} 30^\circ = \sqrt{3} \\ \operatorname{cotg} (540^\circ - 360^\circ) &= \operatorname{cotg} 180^\circ = \text{NŘ} \\ \operatorname{cotg} (1320^\circ - 1080^\circ) &= \operatorname{cotg} 240^\circ = \frac{1}{\sqrt{3}} \end{aligned}$$

2) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} (-1020^\circ) &= \\ \operatorname{cotg} 690^\circ &= \\ \operatorname{cotg} 810^\circ &= \\ \operatorname{cotg} 1755^\circ &= \\ \operatorname{cotg} (-1020^\circ + 1080^\circ) &= \operatorname{cotg} 60^\circ = \frac{1}{\sqrt{3}} \\ \operatorname{cotg} (690^\circ - 360^\circ) &= \operatorname{cotg} 330^\circ = -\sqrt{3} \\ \operatorname{cotg} (810^\circ - 720^\circ) &= \operatorname{cotg} 90^\circ = 0 \\ \operatorname{cotg} (1755^\circ - 1440^\circ) &= \operatorname{cotg} 315^\circ = -1 \end{aligned}$$

3) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} 720^\circ &= \\ \operatorname{cotg} 1740^\circ &= \\ \operatorname{cotg} (-1035^\circ) &= \\ \operatorname{cotg} 480^\circ &= \\ \operatorname{cotg} (720^\circ - 720^\circ) &= \operatorname{cotg} 0^\circ = \text{NŘ} \\ \operatorname{cotg} (1740^\circ - 1440^\circ) &= \operatorname{cotg} 300^\circ = -\frac{1}{\sqrt{3}} \\ \operatorname{cotg} (-1035^\circ + 1080^\circ) &= \operatorname{cotg} 45^\circ = 1 \\ \operatorname{cotg} (480^\circ - 360^\circ) &= \operatorname{cotg} 120^\circ = -\frac{1}{\sqrt{3}} \end{aligned}$$

4) Určete funkční hodnoty:

$$\begin{aligned} \operatorname{cotg} 1350^\circ &= \\ \operatorname{cotg} (-60^\circ) &= \\ \operatorname{cotg} 1650^\circ &= \\ \operatorname{cotg} 945^\circ &= \\ \operatorname{cotg} (1350^\circ - 1080^\circ) &= \operatorname{cotg} 270^\circ = 0 \\ \operatorname{cotg} (-60^\circ + 360^\circ) &= \operatorname{cotg} 300^\circ = -\frac{1}{\sqrt{3}} \\ \operatorname{cotg} (1650^\circ - 1440^\circ) &= \operatorname{cotg} 210^\circ = \sqrt{3} \\ \operatorname{cotg} (945^\circ - 720^\circ) &= \operatorname{cotg} 225^\circ = 1 \end{aligned}$$