Trigonometry Review

[Old] Trig Review

Trig Functions

- $\sin(x)$
  sine
- $\cos(x)$
  cosine
- $\tan(x)$
  tangent

Reciprocal Trig Functions

- $\csc(x) = \dfrac{1}{\sin(x)}$
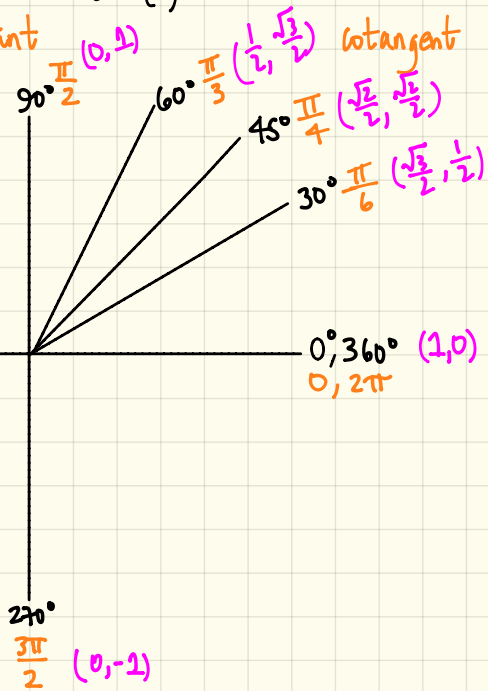 cosecant
- $\sec(x) = \dfrac{1}{\cos(x)}$
  secant
- $\cot(x) = \dfrac{1}{\tan(x)}$
  cotangent

Unit Circle

(x,y)
$(\cos x, \sin x)$

$90° \dfrac{\pi}{2} \ (0,1)$

$60° \dfrac{\pi}{3} \left(\dfrac{1}{2}, \dfrac{\sqrt{2}}{2}\right)$

$45° \dfrac{\pi}{4} \left(\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}\right)$

$30° \dfrac{\pi}{6} \left(\dfrac{\sqrt{2}}{2}, \dfrac{1}{2}\right)$

$(-1,0) \ \pi \ 180°$

$0°, 360° \ (1,0)$
$0, 2\pi$

$270°$
$\dfrac{3\pi}{2} \ (0,-1)$

Converting from Radians to Degrees:

multiply by $\dfrac{180°}{\pi}$

Converting from Degrees to Radians:

multiply by $\dfrac{\pi}{180°}$

Trig Chart — memorize

Degrees	Radians	Sin θ	Cos θ
0°	0, π	0	$\frac{\sqrt{4}}{2} = 1$
30°	$\frac{\pi}{6}$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\frac{\sqrt{3}}{2}$
45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
60°	$\frac{\pi}{6}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$
90°	$\frac{\pi}{2}$	$\frac{\sqrt{4}}{2} = 1$	0

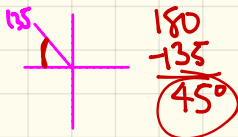Reference angle is the smallest angle that the terminal side of a given angle makes with the x-axis.
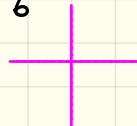
135°

reference angle → 45°

$$\begin{array}{r} 180 \\ -135 \\ \hline 45° \end{array}$$
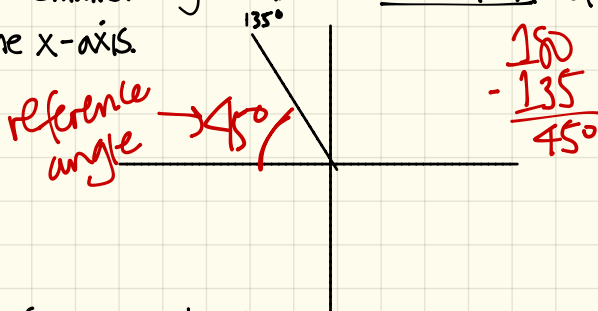
[Examples] Find the reference angle for each angle.

① θ = 300°

$$\begin{array}{r} 360 \\ -300 \\ \hline 60° \end{array}$$

300

② θ = 135°

135

$$\begin{array}{r} 180 \\ -135 \\ \hline 45° \end{array}$$

③ θ = $\frac{7\pi}{6}$

④ θ = $\frac{\pi}{4}$

⑤ θ = $-\frac{5\pi}{3}$

⑥ θ = $-\frac{5\pi}{4}$

[Examples] Compute the exact values of each trig function.

① $\tan\left(\frac{3\pi}{4}\right)$

$= \tan(135°)$

$= -\tan(45°)$

$= \dfrac{\sin(45°)}{-\cos(45°)}$

$= \dfrac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}}$

$= \dfrac{\sqrt{2}}{2} \cdot \dfrac{-2}{\sqrt{2}}$

$\boxed{= -1}$

② $\cos\left(\frac{7\pi}{6}\right)$

$= \cos(210°)$

$= -\cos(30°)$

$= \boxed{-\dfrac{\sqrt{3}}{2}}$

③ $\sin(-30)°$

$= \sin(300°)$

$= \sin(30°)$

$= \boxed{\dfrac{1}{2}}$

④ $\sin(-30°)$

⑤ $\sin(240°)$

$= -\sin(60)$

$= -\dfrac{\sqrt{3}}{2}$

⑥ $\sin\left(\frac{5\pi}{6}\right)$

$= \sin(150°)$

$= -\sin(30°)$

$= -\dfrac{1}{2}$

⑦ $\cos\left(\frac{13\pi}{6}\right)$

$= \cos(390)$

$= \cos(30°)$

$= \dfrac{\sqrt{3}}{2}$

⑧ $\cos\left(\frac{2\pi}{3}\right)$

$= \cos(120)$

$= \cos(60°)$

$= \dfrac{1}{2}$

⑨ $\sin\left(\frac{23\pi}{4}\right)$

$= \sin(1035)$

$= \sin(315)$

$= \sin(45)$

$= \dfrac{\sqrt{2}}{2}$