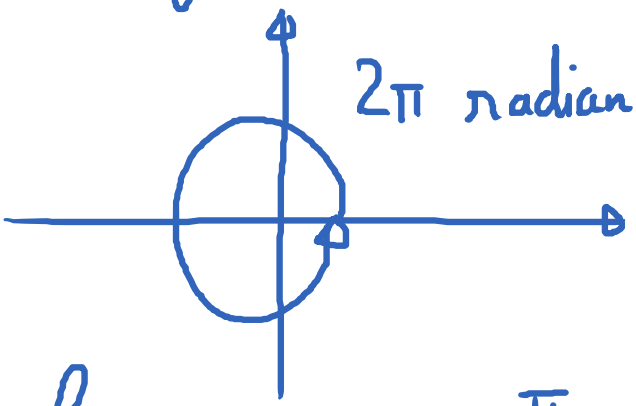
3.1. Radian Measure

Tuesday, October 3, 2017 1:07 PM

Obj: 1: Define Radian Measure.

Convert between Radians and Degrees.

2π radian is the measure in radian of the 360° angle



180° angle $\longleftrightarrow$ π radian

90° angle $\longleftrightarrow$ $\frac{\pi}{2}$ radian

60° angle $\longleftrightarrow$ $\frac{\pi}{3}$ radian

30° angle $\longleftrightarrow$ $\frac{\pi}{6}$ radian

$45^\circ \longleftrightarrow \frac{\pi}{4}$ radian

$49^\circ \longleftrightarrow 49 \cdot \frac{\pi}{180} = \frac{49\pi}{180}$ radian.

(1) To convert a degree measure to radian measure, we multiply the degree measure by $\frac{\pi}{180}$.

E.g. $120^\circ \longrightarrow$ radian?

$$120^\circ = 120 \cdot \frac{\pi}{180} = \frac{120\pi}{180} = \frac{2\pi}{3} \text{ radian}$$

$-270^\circ \longrightarrow$ radian.

$$-270^\circ = -270 \cdot \frac{\pi}{180} = -\frac{270\pi}{180} = \boxed{-\frac{3\pi}{2}} \text{ radian}$$

(2) To convert a radian measure to a degree measure, we multiply the radian measure by

$$\frac{180}{\pi}$$

E.g. $\frac{9\pi}{4}$ radians $\longrightarrow$ degrees ?

$$\frac{9\pi}{4}\text{ radian} = \frac{9\pi}{4}\cdot\frac{180}{\pi} = 405^\circ$$

$$-\frac{5\pi}{6}\text{ radians} \longrightarrow \text{degrees}$$

$$-\frac{5\pi}{6}\text{ radians} = -\frac{5\pi}{6}\cdot\frac{180}{\pi} = -150^\circ$$

Degrees	Radians	$\sin\alpha$	$\cos\alpha$	$\tan\alpha$
0°	0	0	1	0
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°				
180°				
360°				

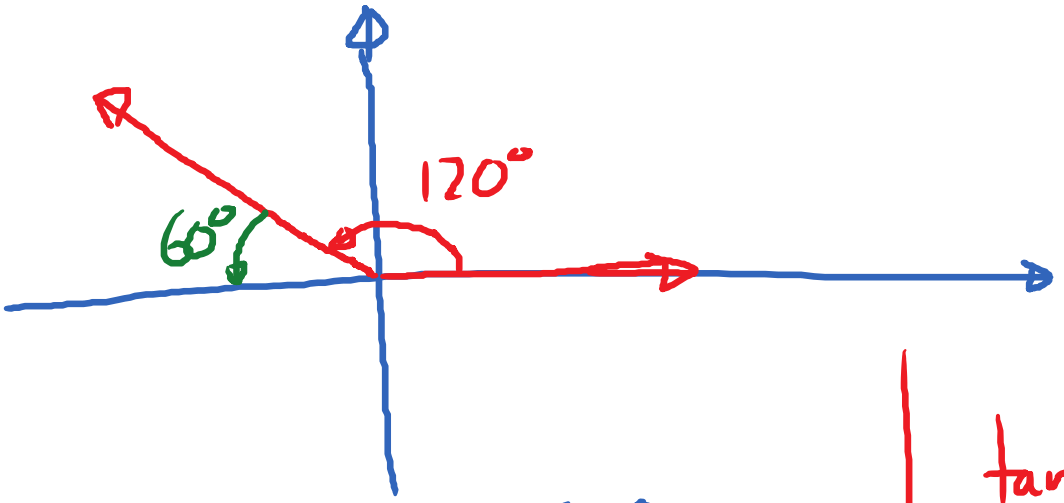
Obj 2: Find trig function values of angles measured in radians

E.g. $\tan\frac{2\pi}{3} = ?$

1st step: Convert to degrees

$$\frac{2\pi}{3}\cdot\frac{180}{\pi} = 120^\circ$$

2nd step: $\tan(120^\circ)$



Reference angle $= 60^\circ$

$\tan(60^\circ) = \sqrt{3}$.

$\tan(120^\circ) = -\sqrt{3}$

E.g. $\cos\left(-\frac{4\pi}{3}\right)$

1st step: $-\frac{4\pi}{3}\cdot\frac{180}{\pi} = -240^\circ$

2nd step: $\cos(-240^\circ)$

Coterminal angle: $-240^\circ + 360^\circ = 120^\circ$

Reference angle: 60°

$\cos(60^\circ) = \frac{1}{2}$.

$\cos(-240^\circ) = -\frac{1}{2}$.