9/17/2012 - Sec 1.6 (cont.) Sec 2.1

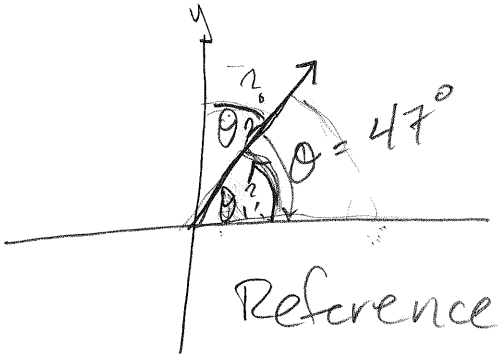
Math 1060

Sec 1.6

Example of a Reference Angle:

$\theta = 47^\circ$

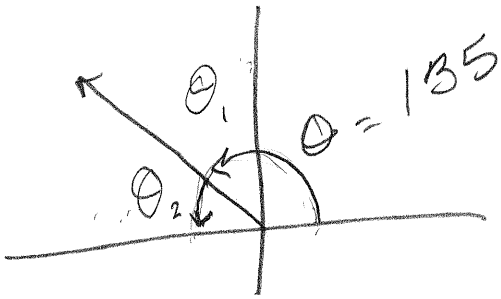
Defn: terminal side to closest X-axis




Reference angle: $\theta_1 = \theta = 47^\circ$

$\theta$ in Quad I, $\theta = \theta'$

$\theta = 135^\circ$




$\theta_2$ is Reference Angle

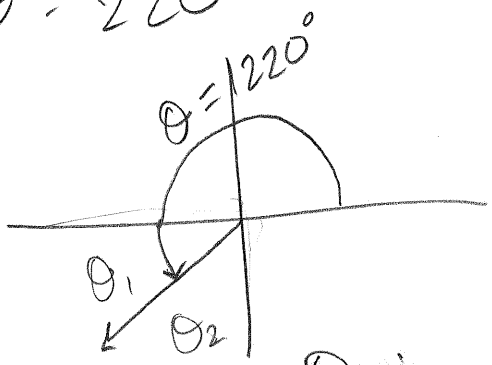
$180 - 135^\circ = 45^\circ$

$\theta$ in Quad II, $\theta' = 180^\circ - \theta$

in Radians

$\theta' = \pi - \theta$

$\theta = 220^\circ$




$\theta_1$ is Reference angle

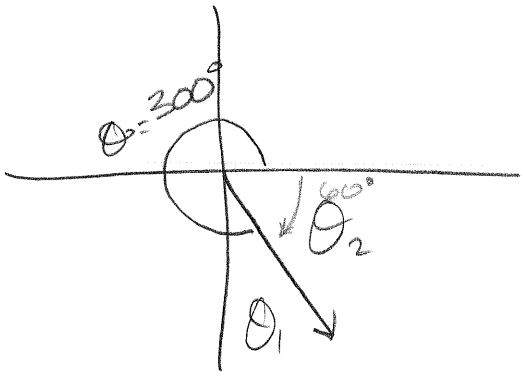
$180 - 220 = -40$

Positive Reference angle $|-40| = 40$.

or $220 - 180 = 40$.

$\theta$ in Quad III, $\theta' = \theta - 180^\circ$ $\theta = \theta - \pi$ in Rads

$\theta = 300^\circ$




$\theta_2$ is Reference angle

$360 - 300 = 60^\circ$

$\theta$ in Quad IV, $\theta' = 360^\circ - \theta$

$\theta' = 2\pi - \theta$

Theorem:

For an angle $\theta$ in standard position

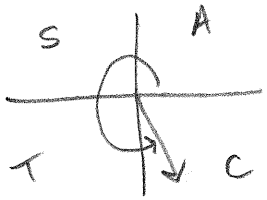
$\sin\theta = \pm\sin\theta'$, $\cos\theta = \pm\cos\theta'$

$\tan\theta = \pm\tan\theta'$, $\sec\theta = \pm\sec\theta'$

$\csc\theta = \pm\csc\theta'$, $\cot\theta = \pm\cot\theta'$

where $\theta'$ is the Reference angle and the sign is determined by the quadrant in which $\theta$ lies.

Ex: $\theta = 300^\circ$



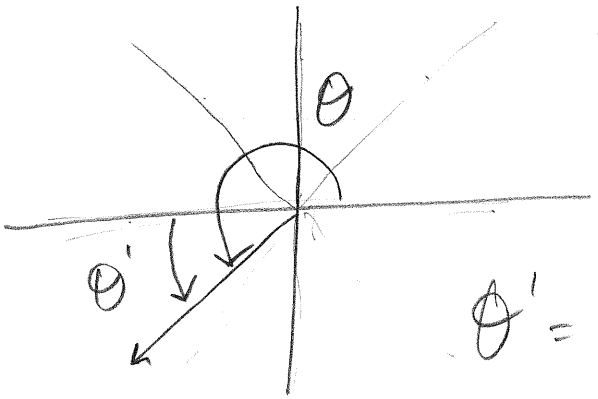

$\theta' = 360 - 300$

$= 60^\circ$

$\sin 300^\circ = -\sin 60^\circ$

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

$\theta = \frac{5\pi}{4}$ $\tan\theta = ?$ $\cos\theta =$




$\theta' = \frac{\pi}{4}$

$\theta' = \frac{5\pi}{4} - \pi = \frac{5\pi}{4} - \frac{4\pi}{4} = \frac{\pi}{4}$

$\tan\frac{5\pi}{4} = \pm\tan\frac{\pi}{4}$

$= 1$

$\cos\theta = -\cos\frac{\pi}{4}$

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

$\tan\frac{5\pi}{4} = 1$ , $\cos\frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$

# Sec 2.1 The Unit Circle and Graphing

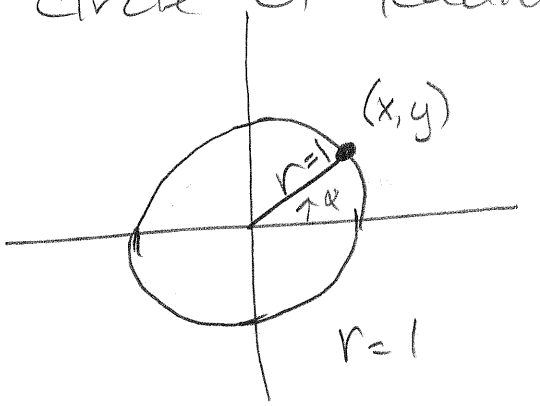
Recall: $\alpha$ in standard position

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

$\csc\alpha = \frac{r}{y}$ , $\sec\alpha = \frac{r}{x}$ , $\cot\alpha = \frac{x}{y}$

What happens when $r = 1$

Circle of Radius 1, centered at origin




unit circle

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

$\csc\alpha = \frac{1}{y}$ $\quad \sec\alpha = \frac{1}{x}$ $\quad \cot\alpha = \frac{x}{y}$

Unit circle: each coordinate is $(\cos\alpha, \sin\alpha)$

## Graphing the Sine Function

$y = \sin(x)$ $\quad y = x^2$

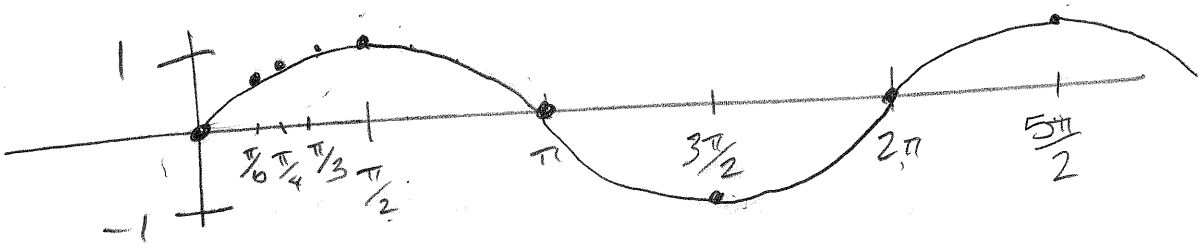
$y$: output value

$x$: input value (Real Numbers) $x$ is in Radians

Table:

| $x$ | $0$ | $\frac{\pi}{2}$ | $\pi$ | $\frac{3\pi}{2}$ | $2\pi$ |
|---|---|---|---|---|---|
| $y = \sin x$ | $0$ | $1$ | $0$ | $-1$ | $0$ |

← 5 Key Points



if we keep going it just starts to repeat meaning $y = \sin x$ is a Periodic function

the smallest positive constant $a$ that is when the periodic function starts to repeat is the called the Period

$y = \sin x$

Period $= 2\pi$

Our sine curve is called

- Sine wave ← most common
- a sinusoidal wave
- a sinusoid