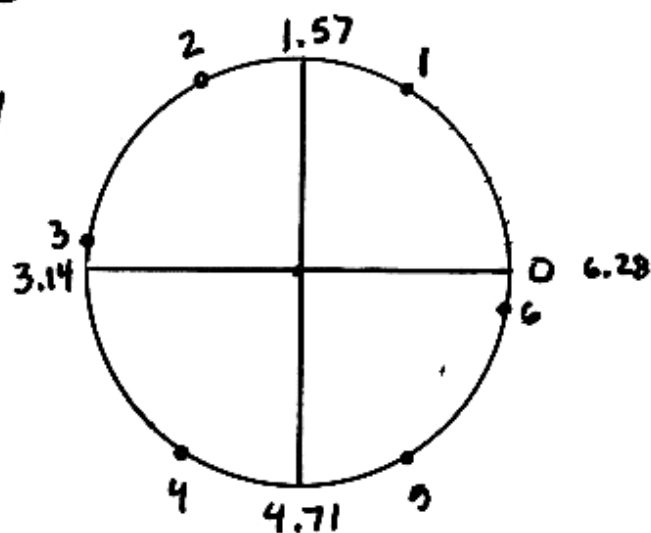SEC 2.4   TRIGONOMETRIC   FUNCTIONS   OF   REAL
         NUMBERS.

REVIEW

RADIANS $\longrightarrow$ REAL NUMBERS

$0 \longrightarrow 0$

$\frac{\pi}{6} \longrightarrow .5236$

$\frac{\pi}{4} \longrightarrow .7854$

$\frac{\pi}{3} \longrightarrow 1.047$

$\frac{\pi}{2} \longrightarrow 1.57$

$\pi \longrightarrow 3.14$

$\frac{3\pi}{2} \longrightarrow 4.71$

$2\pi \longrightarrow 6.28$

1. WRAPPING FUNCTION :   LET W BE   THE
   WRAPPING   FUNCTION , LET t BE A REAL
   NUMBER AND $W(t) = P(x,y)$ ON THE
   UNIT   CIRCLE

   $\sin t = y$ $\csc t = \frac{1}{y}$

   $\cos t = x$ $\sec t = \frac{1}{x}$

   $\tan t = \frac{y}{x}$ $\cot t = \frac{x}{y}$

EX. #1

$$t = \frac{\pi}{6} \qquad (30°)$$

$$y = \sin \frac{\pi}{6} \qquad\qquad x = \cos \frac{\pi}{6}$$

$$\boxed{y = \frac{1}{2}} \approx .5 \qquad\qquad \boxed{x = \frac{\sqrt{3}}{2}} \approx .8660$$
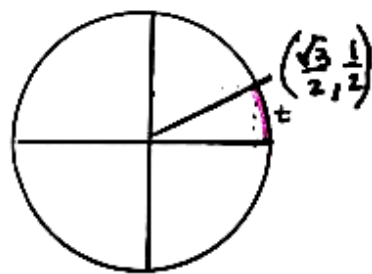
EX. #13

$$\tan\left(\frac{11\pi}{6}\right)$$

$$\tan t = \frac{y}{x} = \frac{\sin t}{\cos t} = \frac{\sin \frac{11\pi}{6}}{\cos \frac{11\pi}{6}} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}}$$

$$= -\frac{1}{\sqrt{3}} = \boxed{\frac{-\sqrt{3}}{3}}$$

2. DOMAIN & RANGE OF TRIG FUNCTIONS

GRAPH	FUNCTION	DOMAIN	RANGE
	$y = \sin t$	$-\infty < t < \infty$	$-1 \le y \le 1$
	$y = \cos t$	$-\infty < t < \infty$	$-1 \le y \le 1$
	$y = \tan t$	$-\infty < t < \infty$ BUT $t \ne \frac{(2n+1)\pi}{2}$	$-\infty < y < \infty$
	$y = \csc t$	$-\infty < t < \infty$ BUT $t \ne n\pi$	$y \le -1 \quad y \ge 1$
	$y = \sec t$	$-\infty < t < \infty$ BUT $t \ne \frac{(2n+1)\pi}{2}$	$y \le -1 \quad y \ge 1$
	$y = \cot t$	$-\infty < t < \infty$ BUT $t \ne n\pi$	$-\infty < y < \infty$

3. ODD AND EVEN FUNCTIONS

   ODD FUNCTIONS: $y = \sin t$ $y = \csc t$

   $y = \tan t$ $y = \cot t$

   EVEN FUNCTIONS: $y = \cos t$ $y = \sec t$

REVIEW BACK IN POLYNOMIALS

$y = x^2$
$y = (-x)^2$ } EVEN FUNCTION
$\quad = x^2$

$y = x^3$
$y = (-x)^3$ } ODD FUNCTION
$\quad = -x^3$

4. NEGATIVE FUNCTIONS

$\sin(-t) = -\sin t$
$\tan(-t) = -\tan t$ } $\cos(-t) = \cos t$
$\csc(-t) = -\csc t$ $\sec(-t) = \sec t$
$\cot(-t) = -\cot t$

5. PERIODS OF TRIG FUNCTIONS

   A) PERIOD FOR $\sin t$, $\cos t$, $\csc t$, $\sec t$
      IS 2π

   B) PERIOD FOR $\tan t$, $\cot t$ IS π.

6. RECIPROCAL FUNCTIONS

$$\sin t = \frac{1}{\csc t} \qquad \csc t = \frac{1}{\sin t}$$

$$\cos t = \frac{1}{\sec t} \qquad \sec t = \frac{1}{\cos t}$$

$$\tan t = \frac{1}{\cot t} \qquad \cot t = \frac{1}{\tan t}$$

7. IDENTITY FUNCTIONS

$$\tan t = \frac{\sin t}{\cos t} \qquad \cot t = \frac{\cos t}{\sin t}$$

8. PYTHAGOREAN IDENTITIES

$$\cos^2 t + \sin^2 t = 1 \quad \nearrow \quad \cos^2 t = 1 - \sin^2 t$$
$$\searrow \quad \sin^2 t = 1 - \cos^2 t$$

$$1 + \tan^2 t = \sec^2 t \quad \nearrow \quad 1 = \sec^2 t - \tan^2 t$$
$$\searrow \quad \tan^2 t = \sec^2 t - 1$$

$$1 + \cot^2 t = \csc^2 t \quad \nearrow \quad 1 = \csc^2 t - \cot^2 t$$
$$\searrow \quad \cot^2 t = \csc^2 t - 1$$

#65

$$\frac{1 - \cos^2 t}{\tan^2 t} \longrightarrow \frac{\sin^2 t}{\dfrac{\sin^2 t}{\cos^2 t}}$$

$\downarrow$ FLIP $\overset{\text{\&}}{.}$ TIMES

$$\sin^2 t \cdot \frac{\cos^2 t}{\sin^2 t}$$

$$\boxed{\cos^2 t}$$