Ex.5 Determine the coordinates of the point P that makes the given angle with the x-axis.

(a) $\theta = 135°$, $\theta_R = 45°$ in QII, so $P = \left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

(b) $\theta = 495°$, $\frac{495}{360} \sim 1$ $495° - 360° = 135°$, so $P = \left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

(c) $\theta = -690°$, $\frac{690}{360} \sim 1$ $-690° + 2(360°) = 30°$, so $P = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

(d) $\theta = -\frac{13\pi}{6}$, $\frac{-13\pi}{6} \cdot \frac{1}{2\pi} = -\frac{13}{12} \sim 1$ $-\frac{13\pi}{6} + 4\pi = \frac{11\pi}{6}$, $\theta_R = \frac{\pi}{6}$ in QIV, $P = \left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$

(e) $\theta = \frac{5\pi}{4}$, $\theta_R = \frac{\pi}{4}$ in QIII, $P = \left(-\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$

(f) $\theta = \frac{9\pi}{2}$, $\frac{9\pi}{2} \cdot \frac{1}{2\pi} = \frac{9}{4} \sim 2$ $\frac{9\pi}{2} - 4\pi = \frac{\pi}{2}$ $P = (0, 1)$

Ex.6 Find the exact value of the given expression.

(a) $\cot(-60°) = \frac{\cos(-60°)}{\sin(-60°)} = \frac{1/2}{-\sqrt{3}/2} = -\frac{1}{\sqrt{3}}$

(b) $\tan\left(\frac{3\pi}{4}\right) = \frac{\sin(3\pi/4)}{\cos(3\pi/4)} = \frac{1/\sqrt{2}}{-1/\sqrt{2}} = -1$

Ex.7 Find the exact values of the six trig functions for

(a) $\theta = \frac{20\pi}{3}$ $\frac{20\pi}{3} \cdot \frac{1}{2\pi} = \frac{10}{3} \sim 3$ $\frac{20\pi}{3} - 6\pi = \frac{2\pi}{3}$ in QII, $\theta_R = \frac{\pi}{3}$

$\sin\theta = \frac{\sqrt{3}}{2}$ $\cos\theta = -\frac{1}{2}$ $\tan\theta = -\sqrt{3}$ $\csc\theta = \frac{2}{\sqrt{3}}$ $\sec\theta = -2$ $\cot\theta = \frac{-1}{\sqrt{3}}$

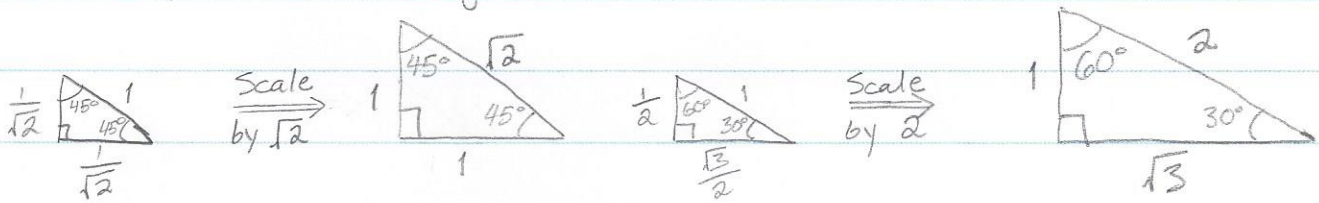
(b) $\theta = 4\pi$ $\theta_R = 0$

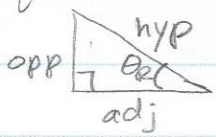
$\sin\theta = 0$ $\cos\theta = 1$ $\tan\theta = 0$ $\csc\theta = \frac{1}{0}$ $\sec\theta = 1$ $\cot\theta = \frac{1}{0}$

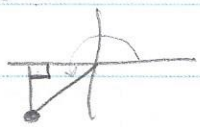
$\csc\theta$: ⇓ N

$\cot\theta$: ⇓ N

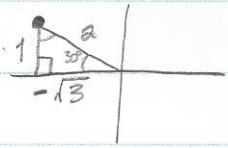
* Another way:
Scale special triangles



Given a θ, still find the quadrant and θ_R.
Then use the triangle 

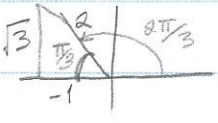
to find the value for the trig functions and $\frac{S|A}{T|C}$ to find the signs for the functions, or find the angle between 0° and 360° (or 0 and 2π) and look at the coordinate plane 

Ex.8 Find the coordinates for the point (like in Ex 5).

(a) $\theta = 150^\circ$ 

$P = (\cos\theta, \sin\theta)$
$P = (-\frac{\sqrt{3}}{2}, \frac{1}{2})$

(b) $\theta = -\frac{10\pi}{3}$ $-\frac{10\pi}{3} \cdot \frac{1}{2\pi} = \frac{5}{3} \sim 1$ $-\frac{10\pi}{3} + 4\pi = \frac{2\pi}{3}$



$P = (-\frac{1}{2}, \frac{\sqrt{3}}{2})$

Ex.9 Find the exact value.

(a) $\sec(225^\circ)$ 

$= -\sqrt{2}$

(b) $\csc(\frac{\pi}{3})$ 

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

(c) $\cot(\frac{11\pi}{6})$ 

$= -\sqrt{3}$