Section 6.2 – Trigonometric Functions: Unit Circle Approach – Day 2

Example 7: Find the exact value of the six trigonometric functions of 450°.

$450^\circ = 360^\circ + 90^\circ$, so $450^\circ \equiv 90^\circ$.

The point $(x, y) = (0, 1)$ lies on the terminal side of $\theta = 450^\circ$ and it lies on the unit circle (r =1).

$$\sin 450^\circ = \frac{y}{r} = \frac{1}{1} = 1 \qquad \cos 450^\circ = \frac{x}{r} = \frac{0}{1} = 0 \qquad \csc 450^\circ = \frac{r}{y} = \frac{1}{1} = 1$$

$$\sec 450^\circ = \frac{r}{x} = \frac{1}{0} = \text{undefined} \qquad \tan 450^\circ = \frac{y}{x} = \frac{1}{0} = \text{undefined} \qquad \cot 450^\circ = \frac{x}{y} = \frac{0}{1} = 0$$

When using your calculator to find values of trigonometric functions you must decide on a mode to work in for the angle – either degrees or radians. The modes are not the same!

Example 8: In degree mode: $150^\circ \Rightarrow (x, y) = \left(\frac{-\sqrt{3}}{2}, \frac{1}{2} \right)$ 150° is less than 1 revolution

$$\sin 150^\circ = \frac{y}{r} = \frac{1/2}{1} = \frac{1}{2} = 0.5$$

In radian mode: $\sin 150 \approx -0.714876$ 150 radians is over 23 (≈ 23.87) revolutions

Your calculator has buttons for sine, cosine, and tangent. Use the fact that $\sec\theta = \frac{1}{\cos\theta}$, $\csc\theta = \frac{1}{\sin\theta}$, and $\cot\theta = \frac{1}{\tan\theta}$ to find the trigonometric functions secant, cosecant, and cotangent.

Example 9: For the each trig function, use a calculator to find the approximate value to two decimal places:

Degree Mode:

a) $\cos 24^\circ \approx 0.913$
≈ 0.91

b) $\csc 57^\circ = \frac{1}{\sin 57^\circ}$
≈ 1.192
≈ 1.19

Radian Mode:

c) $\sin\frac{\pi}{8} \approx 0.382$
≈ 0.38

d) $\cot\left(\frac{4\pi}{9}\right) = \frac{1}{\tan\left(\frac{4\pi}{9}\right)}$
≈ 0.176
≈ 0.18

You should be able to find exact values of the trigonometric functions for the quadrantal angles and for integral multiples of 30°, 45°, and 60°. For other angles you will need to find approximate values using your calculator.