

MAT 123: Introduction to Calculus, R-16  
Fall 2005

Homework 1 - Solution key

1. Convert 150 degrees to radians.

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

2. Convert  $\frac{11\pi}{12}$  radians to degrees.

$$\frac{11\pi}{12} = \frac{11\pi}{12} \frac{180^\circ}{\pi} = 165^\circ.$$

3. Use trigonometric identities to simplify  $\csc^2 \frac{\pi}{6} - \cot^2 \frac{\pi}{6}$

$$\csc^2 \frac{\pi}{6} - \cot^2 \frac{\pi}{6} = \frac{1}{\sin^2 \frac{\pi}{6}} - \frac{\cos^2 \frac{\pi}{6}}{\sin^2 \frac{\pi}{6}} = \frac{1 - \cos^2 \frac{\pi}{6}}{\sin^2 \frac{\pi}{6}} = \frac{\sin^2 \frac{\pi}{6}}{\sin^2 \frac{\pi}{6}} = 1.$$

Notice that

$$1 - \cos^2 \frac{\pi}{6} = \sin^2 \frac{\pi}{6},$$

because

$$\cos^2 \frac{\pi}{6} + \sin^2 \frac{\pi}{6} = 1.$$

4. Find the value of  $\sec\left(-\frac{\pi}{3}\right)$ . You can make use of the figure on p.450 of the textbook. (*Hint:* Is the secant function even or odd?)

$$\sec\left(-\frac{\pi}{3}\right) = \frac{1}{\cos\left(-\frac{\pi}{3}\right)} = \frac{1}{\cos\left(\frac{\pi}{3}\right)} = \frac{1}{\frac{1}{2}} = 2$$

5. If  $\sin t = \frac{2}{3}$  and  $\cos t = \frac{\sqrt{5}}{3}$ , find  $\tan t$ ,  $\sec t$ ,  $\csc t$ ,  $\cot t$ .

$$\tan t = \frac{\sin t}{\cos t} = \frac{2}{\sqrt{5}}, \cot t = \frac{\sqrt{5}}{2}, \csc t = \frac{3}{\sqrt{5}}, \sec t = \frac{3}{\sqrt{2}}.$$