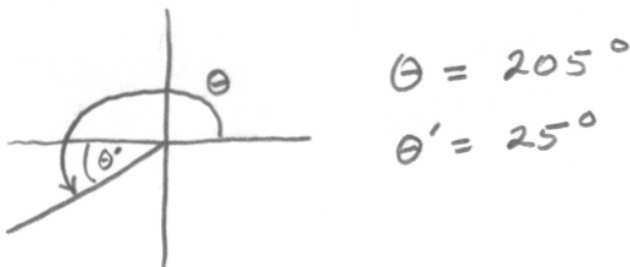
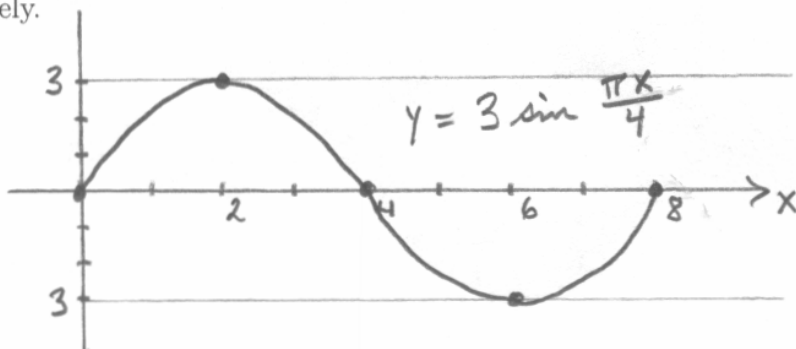


SHOW YOUR WORK FOR FULL CREDIT.

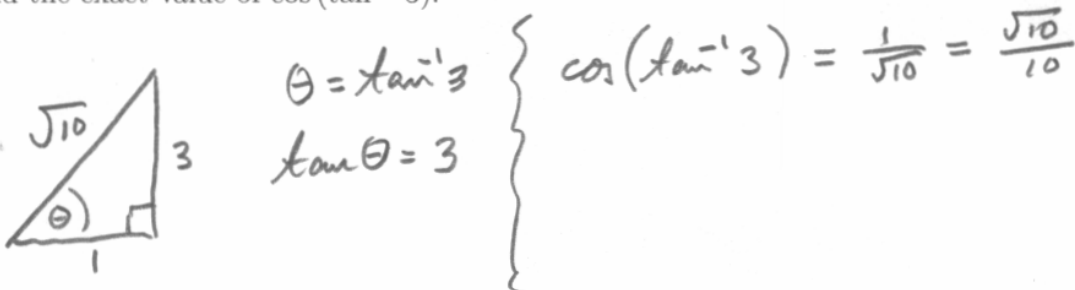
1. If  $\theta = 205^\circ$ , find the reference angle  $\theta'$  and sketch  $\theta$  and  $\theta'$  in standard position.



2. Sketch a graph of the equation  $y = 3 \sin \frac{\pi x}{4}$ . Draw one period and label your axes completely.



3. Find the exact value of  $\cos(\tan^{-1} 3)$ .



4. The sun is  $25^\circ$  above the horizon. Find the length  $L$  of a shadow cast by a building that is 500 feet tall. Give the exact answer.



5. Simplify  $\sin \theta \tan \theta + \cos \theta$  as much as possible.

$$\begin{aligned} \sin \theta \frac{\sin \theta}{\cos \theta} + \frac{\cos^2 \theta}{\cos \theta} & \left. \begin{array}{l} \\ \\ \frac{\sin^2 \theta + \cos^2 \theta}{\cos \theta} \end{array} \right\} \begin{array}{l} \frac{1}{\cos \theta} \\ \\ \sec \theta \end{array} \end{aligned}$$

6. Verify the identity  $\tan x + \cot x = \sec x \csc x$ .

$$\begin{aligned} \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} &= \frac{\sin^2 x + \cos^2 x}{\cos x \sin x} \\ &= \frac{1}{\cos x \sin x} \\ &= \frac{1}{\cos x} \frac{1}{\sin x} = \sec x \csc x \end{aligned}$$

7. Find the exact solution(s) of the equation  $\csc \theta = \frac{2\sqrt{3}}{3}$  in the interval  $[0, 2\pi)$ .

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

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

$$\theta = \frac{\pi}{3}, \frac{2\pi}{3}$$

8. Find the exact solution(s) of the equation  $\sin 2x - \cos x = 0$  in the interval  $[0, 2\pi)$ .

$$2 \sin x \cos x - \cos x = 0$$

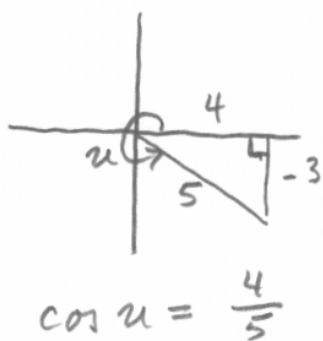
$$\cos x (2 \sin x - 1) = 0$$

$$\left. \begin{array}{l} \cos x = 0 \\ x = \frac{\pi}{2}, \frac{3\pi}{2} \end{array} \right\} \begin{array}{l} \sin x = \frac{1}{2} \\ x = \frac{\pi}{6}, \frac{5\pi}{6} \end{array}$$

9. Find the exact value of  $\cos 105^\circ$ .

$$\begin{aligned} \cos(60^\circ + 45^\circ) &= \cos 60^\circ \cos 45^\circ - \sin 60^\circ \sin 45^\circ \\ &= \frac{1}{2} \frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{2} \frac{\sqrt{2}}{2} \\ &= \frac{\sqrt{2}}{4} (1 - \sqrt{3}) \end{aligned}$$

10. If  $\tan u = -\frac{3}{4}$  where  $\frac{3\pi}{2} < u < 2\pi$ , find the exact value of  $\cos \frac{u}{2}$ . Simplify your answer.



$$\frac{3\pi}{2} < u < 2\pi$$

$$\frac{3\pi}{4} < \frac{u}{2} < \pi$$

$$\cos \frac{u}{2} < 0$$

$$\cos \frac{u}{2} = -\sqrt{\frac{1 + \frac{4}{5}}{2}}$$

$$= -\sqrt{\frac{5+4}{10}}$$

$$= -\sqrt{\frac{9}{10}}$$

$$= -\frac{3}{\sqrt{10}}$$

$$= -\frac{3}{10} \sqrt{10}$$