

# Math 130 - Quiz 3

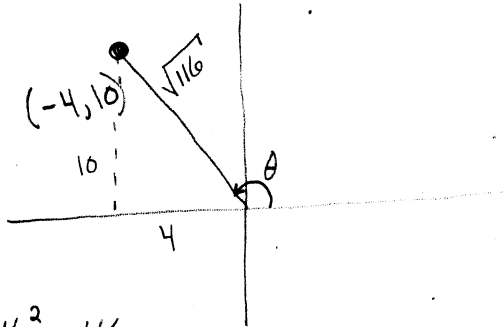
September 4, 2019

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations when necessary. You must work individually on this quiz. This quiz is due September 9.

1. (3.5 points) The point  $(-4, 10)$  is on the terminal side of an angle in standard position. Find the exact values of the six trigonometric functions at that angle. Simplify your answers as much as possible.



$$10^2 + 4^2 = 116$$

$$\sqrt{116} = 2\sqrt{29}$$

$$\sin \theta = \frac{5}{\sqrt{29}}$$

$$\csc \theta = \frac{\sqrt{29}}{5}$$

$$\cos \theta = \frac{-2}{\sqrt{29}}$$

$$\sec \theta = -\frac{\sqrt{29}}{2}$$

$$\tan \theta = -\frac{5}{2}$$

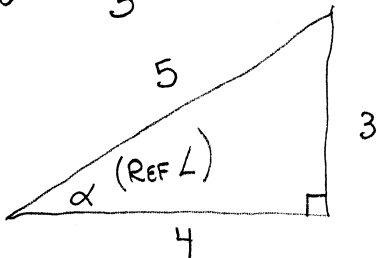
$$\cot \theta = -\frac{2}{5}$$

2. (3.5 points) The angle  $\theta$  lies in the 3rd quadrant and  $\cos \theta = -0.8$ . Find the exact values of the six trigonometric functions at the angle  $\theta$ .

$$\cos \theta = -\frac{4}{5}$$

$$\cos \theta < 0$$

$$\sin \theta < 0$$



$$5^2 - 4^2 = 3^2$$

$$\cos \theta = -\frac{4}{5}$$

$$\sec \theta = -\frac{5}{4}$$

$$\sin \theta = -\frac{3}{5}$$

$$\csc \theta = -\frac{5}{3}$$

$$\tan \theta = \frac{3}{4}$$

$$\cot \theta = \frac{4}{3}$$

3. (1 point) Prove that  $\sin^2 \theta - \cos^2 \theta = 2\sin^2 \theta - 1$  by using trig identities to transform one side of the equation into the other.

$$\sin^2 \theta - \cos^2 \theta$$

$$= \sin^2 \theta - (1 - \sin^2 \theta)$$

$$= \sin^2 \theta - 1 + \sin^2 \theta$$

$$= 2\sin^2 \theta - 1$$

$$\text{Using } \cos^2 \theta = 1 - \sin^2 \theta$$

From Pythag. Id.

4. (3 points) Determine the exact value of each without using a calculator.

$$(a) \tan\left(\frac{13\pi}{6}\right) = \tan \frac{\pi}{6} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

↑  
1<sup>ST</sup> QUAD

$$\text{REF } \angle = \frac{\pi}{6}$$

$$(b) \sin\left(\frac{-23\pi}{4}\right) = \sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$$

↑  
1<sup>ST</sup> QUAD

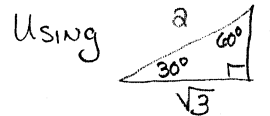
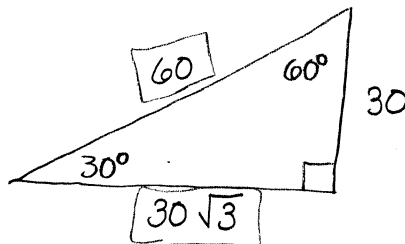
$$\text{REF } \angle = \frac{\pi}{4}$$

$$(c) \sec(-570^\circ) = -\sec 30^\circ = -\frac{1}{\cos 30^\circ} = -\frac{2}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$$

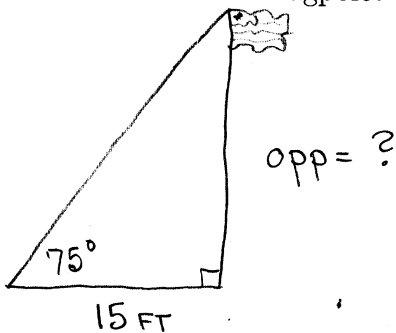
↑  
3<sup>RD</sup> QUAD

$$\text{REF } \angle = 30^\circ$$

5. (2 points) The shortest side of a  $30^\circ - 60^\circ - 90^\circ$  triangle has length 30 units. Find the lengths of the hypotenuse and the other side.



6. (2 points) At 15 feet from the base of a flagpole, the angle of elevation to the top is  $75^\circ$ . How tall is the flagpole?



$$\tan 75^\circ = \frac{\text{opp}}{15}$$

$$\text{opp} = 15 \tan 75^\circ = 55.98076\dots$$

$$\approx 55.98 \text{ FT}$$

$$\approx 56 \text{ FT}$$