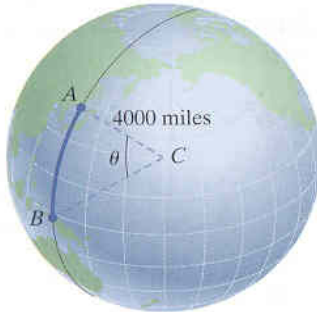


NAME: _____

MATH 128 QUIZ 3 FALL 2009

This is due Thursday, Nov. 5th. PLEASE SHOW ALL WORK!

1.) To measure two distances on the Earth, we must account for the curvature of the Earth. We measure along a circle with a center C at the center of the Earth (see below). The radius of the Earth is 4000 miles.



a.) If $\theta = 21^\circ$, find the distance between A and B to the nearest mile. 1a. _____

b.) Suppose $\theta = 15^\circ$. Find the area of this sector in square miles. 1b. _____

3.) A wind machine used to generate electricity has blades that are 8 feet in length. The propeller is rotating at 200 revolutions per **minute**. Find the angular speed, in radians per **second**, as well as the linear speed, in feet per **second**, of the tips of the blades. angular speed: _____
linear speed: _____

3.) My current electric bicycle uses a friction drive system. The drive wheel has a **diameter** of 2.125 in and makes contact with the back tire which has a **diameter** of 20 in. Just like with a pulley, the linear speeds of both wheels are the same. At 17.38 mph the bicycle wheel is rotating at 292.1875 rpm. Determine the rpm of the drive wheel. 3. _____



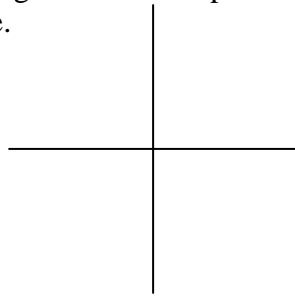
4.) From a point 120 feet from the base of a church, the angles of elevation to the top of the building and to the top of a cross on the building are 38° and 43° respectively. Find the height of the cross. (Assume the ground is flat.)

4. _____

5.) Find the exact value of $\sin\left(\frac{10\pi}{3}\right)$ using reference angles. Draw the angle in standard position and indicate the reference angle.

Value: _____

Ref. Angle: _____

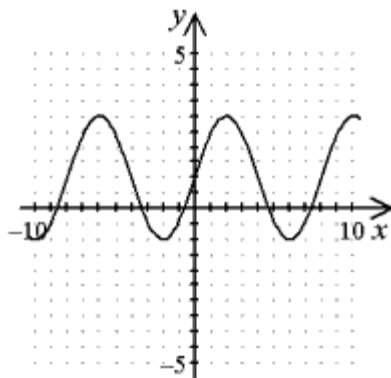


6.) Find the exact value and reference angle for $\cot(-150^\circ)$.

Value: _____

Ref. Angle: _____

7.) Identify the period and amplitude. Write the equation. Hint: Use the following equation $y = A\cos(\omega x - \phi) + 1$ and find A , ω , then ϕ .



Period: _____

Amplitude: _____

Equation: _____

8.) Graph $y = -\tan\left(x + \frac{\pi}{3}\right)$ over 2 periods.

9.) (10 points) Use $y = -2\sin\left(\frac{x}{3} + \frac{\pi}{4}\right)$ to answer the questions.

a.) Find the amplitude.

9a. _____

b.) Find the period.

9b. _____

c.) Find the phase shift.

9c. _____

d.) Graph the function over one period.

10.) Let $A = 3.2$ radians. Does $\cos^{-1}(\cos A) = A$?
(Answer yes or no. If no, give the reason why.)

10. _____

11.) Solve for x : $-3(\sin^{-1}(x) + \pi) = -2(\pi + 3\sin^{-1}(x))$

11. _____

12.) Find the exact value of $\sec\left(\tan^{-1}\left(-\frac{3}{\sqrt{7}}\right)\right)$.

12. Answer: $\frac{4\sqrt{7}}{7}$

13.) Prove the identity: $\frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = 2 + 2 \tan^2 \theta$.

14.) Prove the identity: $\frac{\sin x - \cos x}{\sin x} + \frac{\cos x - \sin x}{\cos x} = 2 - \sec x \csc x$.

15.) (20 points) Find the remaining exact trig values if you are given $\cot \theta = 3$ and $\pi < \theta < \frac{3\pi}{2}$.

Rationalize all roots.

$\sin \theta$: _____ $\csc \theta$: _____

$\cos \theta$: _____ $\sec \theta$: _____

$\tan \theta$: _____ $\sin 2\theta$: _____

$\cos 2\theta$: _____ $\tan 2\theta$: _____

$\sin \frac{\theta}{2}$: _____ $\tan \frac{\theta}{2}$: _____

16.) Prove the identity by using a sum formula and identities:

$$\frac{\cos(x - y)}{\cos(x + y)} = \frac{1 + \tan x \tan y}{1 - \tan x \tan y}$$