**Mathematics 1321, Trigonometry**        **FINAL EXAM**        **Fall 2011**

WORK ALL PROBLEMS.        SHOW WORK.        CLEARLY INDICATE ANSWERS.
Clearly state any trigonometric identities used in any arguments. All graphs should have axes labeled and scale clearly indicated. Give exact answers unless indicated otherwise.

1.) If $\sin\theta = \dfrac{3}{7}$ where $\theta$ is a second quadrant angle, determine the exact values of $\cos\theta$ and $\tan\theta$. Do not use a calculator.

2.) A triangle has angles of $x°$, $(3x+60)°$ and $(2x-30)°$. Determine the number of degrees in each angle.

3.) The angle of elevation of the top of a redwood tree from a point on the ground 80.1 feet from the base of the tree is $75.0°$. Determine the height of the tree to the nearest foot.

4.) A plane flies 1.3 hours at 110 mph on a bearing of $27°$. It then turns and flies 1.5 hours at the same speed on a bearing of $117°$. Determine its distance from its starting point.

5.) Val and Matt decide to bake a homemade pizza. They invite their friends, Brett and Kendall, over. The diameter of the pizza is 14 inches.
    a) If they slice the pizza into 4 equal pieces, what is the area of each slice?
    b) Val and Kendall each have a super cute puppy. If they include the dogs in the pizza party, what is the area of each pizza slice?

6.) The first Ferris Wheel was built for the Chicago Exposition in 1893. It had a diameter of 250 feet and took 30 minutes to make one revolution. Determine the linear velocity in feet per second of a person riding the Ferris Wheel. Give your answer to the nearest 0.1 ft/sec.

7.) Draw the graph of $y = -2\sin(3x)$ over a two-period interval. Determine the amplitude and the period of this function.

8.) At right is the graph of a trigonometric function. Determine an equation of the form $f(x) = a\cos(bx + c)$ for this graph.
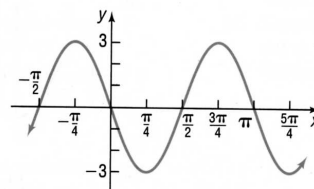
9.) Verify the trigonometric identity $\dfrac{\cos x \sin 2x}{1 + \cos 2x} = \sin x$.



10.) Prove that $\tan\theta + \cot\theta - \sec\theta\csc\theta = 0$ for all angles $\theta$ for which the four trigonometric functions are defined.

11.) Evaluate $\sin\left(\csc^{-1}(2) + \cot^{-1}(\sqrt{3})\right)$. Do not use a calculator.

12.) Solve $\sec^2 x = 3\csc^2 x$ over $[0, 2\pi)$.

13.) Determine the remaining angles and sides, to the nearest 0.1 cm and $0.1°$, of $\triangle ABC$ if $A = 61.4°$, $a = 35.5$ cm and $b = 39.2$ cm.

14.) Let $\mathbf{u} = \langle 5, 12\rangle$ and $\mathbf{v} = \langle 4, 3\rangle$ be vectors.
    a) Evaluate $\mathbf{u}\cdot\mathbf{v}$ and $2\mathbf{u} + \mathbf{v}$.
    b) Determine the angle $\theta$ between $\mathbf{u}$ and $\mathbf{v}$.