Math 1321 Trigonometry   Final Exam   Spring 2012
Show all work and answers in your blue book.

1. a) Convert 840° to radian measure
    b) Find the least positive measure of an angle that is coterminal with 840°
    c) Find the exact value of $\tan(840°)$

2. Find $\sin(-t)$, $\csc(t)$, and $\cos(t)$ if $\sin(t) = \dfrac{2}{3}$ and t is in quadrant II.

3. To measure the height of a flagpole, Armando stood 24.7 feet from the base of the flagpole and determined that the angle of elevation to the top of the pole is 30°18′. What is the length of the flagpole? Round your answer to the nearest tenth.

4. For a circle of radius 10 cm,
    a) Find the length of the arc intercepted by a central angle θ = 160°. Give your answer to the nearest tenth.
    b) Find the area of the sector formed in this circle by angle θ = 160°. You may leave your answer in terms of π.

5. Sketch a graph of $f(t) = -3\cos(4t + \pi)$ over a two period interval. Label the intercepts and the values of *t* at which the maximum and minimum values occur. Identify the amplitude, period, and phase shift of the graph.

6. Give the location of the vertical asymptotes of the graph of $y = \tan 2x$ that are in the interval $[-2\pi, 2\pi]$.

7. A satellite traveling in a circular orbit 1600 km above the surface of Earth takes 2 hours to make an orbit. The radius of Earth is approximately 6400 km. Approximate the linear speed of the satellite in kilometers per hour.

8. Verify that $\tan^2 x(1 + \cot^2 x) = \dfrac{1}{1 - \sin^2 x}$ is an identity.

9. Suppose $\cos\theta = \dfrac{-12}{13}$ with angle θ in quadrant II. Give exact values for:

    a) $\cos(\theta - \pi/6)$ b) $\sin(2\theta)$ c) $\tan(\theta/2)$

10. Use an appropriate identity to find the exact value of each of the following:
    a) $\sin(22.5°)$
    b) $\dfrac{\tan\frac{5\pi}{12} - \tan\frac{\pi}{4}}{1 + \tan\frac{5\pi}{12}\tan\frac{\pi}{4}}$

11. a) Find the exact values of $\arctan\sqrt{3}$ and $\sin^{-1}(\sin(5\pi/6))$
    b) Write $\cos(\tan^{-1} x)$ as an algebraic expression in *x*.

12. Find all values of θ in $[0, 2\pi)$ for which $\sin^2 x = 3\sin x$.

13. Solve $\triangle ABC$ if $m\angle A = 31.1°$, $m\angle C = 112.9°$, and side $AC = 24.6$ cm

14. Two boats leave a harbor at the same time, traveling on courses that make an angle of 82° between them. When the slower boat has traveled 62 km, the faster one has traveled 79 km. At that time, what is the distance between the boats? Give your answer to the nearest tenth.

15. Let $a = \langle 4, -1 \rangle$ and $b = \langle 2, 1 \rangle$ be vectors.
    Find $b - 2a$, $a \cdot b$, and the measure of the angle between a and b *(in degrees and minute*