Practice Exam 4   Algebra & Trig   12/2/2003

Each problem is worth 10 points. Show adequate justification for full credit. Please circle all answers and keep your work as legible as possible.

1. Verify the trig identity $(\sin \theta + \cos \theta)^2 = 2\sin \theta \cos \theta + 1$

2. (a) If vector $\mathbf{v_1} = 6\mathbf{i} - 2\mathbf{j}$ and $\mathbf{v_2} = -\mathbf{i} + 3\mathbf{j}$, find $\mathbf{v_1} + \mathbf{v_2}$.

(b) Find a unit vector $\mathbf{u}$ in the direction of the vector $\mathbf{v_3} = -5\mathbf{i} + 12\mathbf{j}$.

3. Convert the point (-6,8) to polar coordinates.

4. Find an exact value for cos 75°.

5. Jenny is trying to make a triangular sandbox for her kids because she has three boards. If one of the boards is 6 feet long, another is 7 feet long, and the last one is 8 feet long, what are the measures of the three angles in that triangle, rounded to the nearest degree?

6. If θ is a second-quadrant angle for which $\sin \theta = 3/5$, find an exact value for $\sin 2\theta$.

7. Bunny is having some trouble with trig functions. She says "Okay, so like, I get how to do the thing where they say to verify a trig identity pretty good usually. But there was one on our practice test that said we were supposed to say whether this one was an identity *or not*, and I tried to make one side be like the other but I couldn't. So how do you *know* that there's not a way to do it? Do you just, like try for a few minutes and if you can't then you say it's wrong?"

Explain clearly to Bunny how you could determine when something is *not* a trig identity.

8. Find all real solutions to the equation $\sin x \cos x + \cos x = 0$.

9. Verify the trig identity $\dfrac{\tan x - \cot x}{\tan x + \cot x} = 1 - 2\cos^2 x$.

10. Rescue workers are trying to locate some hikers who've gotten lost in a forest. From a brief cell-phone call they've determined that the hikers are due East from the park entrance, and 9 miles from the ranger station which is located 11 miles Northeast from the park entrance. How far are the campers from the entrance? [Hint: There are *two* possibilities, and you need to find both for full credit.]

Extra Credit (5 points possible):

If a triangle has sides of lengths 2, 3, and 4, what is the area of that triangle?