Math 150 Week in Review 9 Problem Set

(Parts of Problem 11 were taken from *Precalculus: Functions and Graphs* by Swokowski/Cole)

1. Solve the following triangle: $a = 9, b = 7, c = 4$

2. A man goes for a jog. He starts out from his house going N 85° W for 3 miles. He then changes to a direction of N 12° W and jogs in this direction for 5 miles.

   (a) How far from his house is he at this point?

   (b) What bearing should he head in to get back to his house?

3. Simplify the following expression completely: $\dfrac{(\sec u - \tan u)(\csc u + 1)}{\csc u}$

4. Substitute $x = 4\sin\theta$ into the expression $\dfrac{x^2}{\sqrt{16 - x^2}}$ and simplify. (Assume that θ is in Quadrant I.)

5. Use Addition or Subtraction Formulas to evaluate the following.

   (a) $\cos 165^\circ$

(b) $\sin(-\frac{5\pi}{12})$

(c) $\left(\dfrac{\tan 62^\circ - \tan 17^\circ}{1 + \tan 62^\circ \tan 17^\circ}\right)(\cos 39^\circ \cos 21^\circ - \sin 39^\circ \sin 21^\circ)$

6. Given that $\csc x = \frac{3}{2}$ and that x is in Quadrant II, find $\sin 2x, \cos 2x$, and $\tan 2x$.

7. Use a Half-Angle Formula to evaluate $\sin 75°$.

8. Given that $\tan x = \frac{5}{2}$ and that $180° < x < 270°$, find $\sin \frac{x}{2}, \cos \frac{x}{2}$, and $\tan \frac{x}{2}$.

9. Use a Sum-to-Product Formula to evaluate $\cos 105° + \cos 15°$.

10. Use a Product-to-Sum Formula to evaluate $\sin 172.5° \sin 52.5°$.

11. Verify (prove) the following identities.

(a) $\dfrac{1+\sec x}{\tan x} - \dfrac{\tan x}{1+\sec x} = 2\cot x$

(b) $\dfrac{\cot(-t)+\tan(-t)}{\tan(\frac{\pi}{2}-t)} = -\sec^2 t$

(c) $\tan\left(\frac{\pi}{2}-u\right) = \cot u$

(d) $\dfrac{2(\tan x - \cot x)}{\tan^2 x - \cot^2 x} = \sin 2x$

(e) $\sin^2 3x \cos^2 3x = \frac{1}{8}(1 - \cos 12x)$

(f) $\cos 4\theta = 8\cos^4\theta - 8\cos^2\theta + 1$

(g) $\dfrac{\sin 12x}{\sin 11x + \sin x} = \dfrac{\cos 6x}{\cos 5x}$

Not all instructors may have covered the following two questions.

12. Find the area of the triangle with $a = 5, b = 10, c = 7$.

13. Write the following in terms of sine only. $-2\sin x - 2\sqrt{3}\cos x$