Math 150 Week-in-Review 9 Problem Set

(Parts of Problem 6 were taken from *Precalculus: Functions and Graphs* by Swokowski/Cole)

1. Use an Addition or Subtraction Formula to evaluate the following.

   (a) $\cos 165^\circ$

   (b) $\tan(-\frac{\pi}{12})$

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

3. Use a Half-Angle Formula to evaluate $\sin 75^\circ$.

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

5. Use a Sum-to-Product Formula to evaluate $\cos 105^\circ + \cos 15^\circ$.

6. Prove the following identities:

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

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

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

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

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

7. Evaluate the following.

(a) $\cos^{-1}(-\frac{\sqrt{3}}{2})$

(b) $\sin^{-1}(-\frac{\sqrt{2}}{2})$

(c) $\tan^{-1}(\tan \frac{2\pi}{3})$

(d) $\csc(\tan^{-1}\frac{1}{3})$

(e) $\tan(2\cos^{-1}\frac{5}{6})$

8. Express $\sin(2\cot^{-1}x)$ as an algebraic expression in x.

9. Find all solutions to the following trig equations.

(a) $2\sin^2 u = 1 - \sin u$

(b) $3\tan^3 x - 3\tan^2 x - \tan x + 1 = 0$

(c) $2\cos^2 \frac{x}{3} = 1$

10. (i) Find all solutions to the equation. (ii) Find all solutions in the interval $[0, 2\pi)$.

$$\sin 100x \cos 97x - \cos 100x \sin 97x = -\frac{\sqrt{3}}{2}$$