

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) $\frac{2(\tan x - \cot x)}{\tan^2 x - \cot^2 x} = \sin 2x$
 - (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) $\frac{\sin 12x}{\sin 11x + \sin x} = \frac{\cos 6x}{\cos 5x}$
7. Evaluate the following.
 - (a) $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$
 - (b) $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$
 - (c) $\tan^{-1}\left(\tan \frac{2\pi}{3}\right)$
 - (d) $\csc\left(\tan^{-1} \frac{1}{3}\right)$
 - (e) $\tan\left(2 \cos^{-1} \frac{5}{6}\right)$
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 $[0, 2\pi)$.

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