

Math 1113: Precalculus
Extra Credit Work
Due date: April 29 at the beginning of the class

Name:

1. Simplify.

(a) $\sin^2 x (1 + \cot^2 x)$

(c) $\tan^2(x) - \sec^2(x)$

(b) $\frac{1 - \cos x}{\sin x} + \frac{\sin x}{1 - \cos x}$

(d) $\frac{2 + \tan^2 x}{\sec^2 x} - 1$

2. Verify the identity.

(a) $\cos x + \sin x \tan x = \sec x$

(d) $\frac{1 + \sec^2 x}{1 + \tan^2 x} = 1 + \cos^2 x$

(b) $\frac{1 + \cos x}{1 - \cos x} - \frac{1 - \cos x}{1 + \cos x} = 4 \cot x \csc x$

(e) $\cos \theta (\sec \theta - \cos \theta) = \sin^2 \theta$

(c) $(\sin x + \cos x)^2 = 1 + 2 \sin x \cos x$

(f) $\frac{\cos t}{1 - \sin t} = \sec t + \tan t$

3. Find the exact value of

(a) $\sin(\frac{\pi}{2})$

(d) $\sin(\frac{5\pi}{12})$

(b) $\tan(105^\circ)$

(e) $\sin(\frac{4\pi}{5}) \cos(\frac{7\pi}{15}) - \cos(\frac{4\pi}{5}) \sin(\frac{7\pi}{15})$

(c) $\cos 75^\circ \cos 15^\circ + \sin 75^\circ \sin 15^\circ$

(f) $\frac{\tan(43^\circ) - \tan(13^\circ)}{1 + \tan(43^\circ) \tan(13^\circ)}$

4. Prove the identity

(a) $\cos(x - \frac{\pi}{2}) = \sin x$

(b) $\sin(x - \frac{\pi}{2}) = -\cos x$

5. Find the exact value of

(a) $\sin(\cos^{-1}(\frac{2}{3}) - \tan^{-1}(\frac{1}{4}))$

6. Find the exact value of $\sin(2x)$, $\cos(2x)$ and $\tan(2x)$ from the given information below.

(a)

$$\sin(x) = \frac{3}{5} \quad x \text{ is in quadrant I}$$

(b)

$$\tan(x) = \frac{-4}{3} \quad x \text{ is in quadrant II}$$

7. Use an appropriate Half-Angle Formula to find the exact value of the expression.

(a) $\sin(22.5^\circ)$

(b) $\tan(22.5^\circ)$

8. Find the exact value of $\sin(\frac{x}{2})$, $\cos(\frac{x}{2})$ from the given information below $\cos(x) = -\frac{4}{5}$, x is in quadrant II.

9. Find all solution of

(a) $2\sin x - 1 = 0$

(c) $\sin(x)\cos x - 2\sin x = 0$

(b) $\sin^2 x + 3\sin x - 4 = 0$

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

10. Solve the following equation in the interval $[0, 2\pi)$.

(a) $\cos(2x) + \sin^2(x) = 0$

(c) $2\sin(2x) = 1$

(b) $\cos(2x) + \cos(x) = 2$

(d) $2\cos(2x) - 1 = 0$

11.

$$2\cos 3\theta - 1 = 0$$

(a) Find all solutions of the equation.

(b) Find the solutions in the interval $[0, 2\pi)$

12.

$$\tan \frac{\theta}{2} - 1 = 0$$

(a) Find all solutions of the equation.

(b) Find the solutions in the interval $[0, 2\pi)$