MA 1323 Section 01   *Practice Exam 2*   *November 19, 2019*

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work, answer or there is no justification to a solution, you will receive little or no credit!

1. Find the exact value of $\cos(4\theta + \pi)$ if $\theta = \dfrac{\pi}{4}$.

2. Find the exact value of $\sin(5\theta + \pi)$ if $\theta = \dfrac{\pi}{2}$.

3. A Ferris wheel has a radius of 25 ft. A person takes a seat and the then wheel turns $\frac{5\pi}{6}$ radians. How far is the person above the ground? If it takes 30 seconds for the wheel to turn $\frac{\pi}{3}$ radians, what is the angular speed?

4. The speedometer of Terry's Honda civic SI is designed to accurate with tires of radius 14 inches. Find the number of rotations of a tire in 1 hour if the car is driven at 55 mph. Suppose that oversized tires of radius 16 inches are placed on the car. If the car is now driven for 1 hour with the speedometer reading 55 mph, how far has the car gone? If the speed limit is 55 mph, does Terry deserve a speeding ticket?

5. Consider the function
$$f(x) = 3 + 4\cos(3x + \pi)$$
Determine the period, amplitude, the range, the y-intercept and it's phase shift.

6. Consider the function
$$f(x) = -3 + \sin\left(x + \frac{\pi}{2}\right)$$
Determine the period, amplitude, the range, the y-intercept and it's phase shift.

7. Graph the following function over a two-period interval:
$$f(x) = 1 - \tan\left(x + \frac{\pi}{2}\right)$$

8. Graph the following function over a two-period interval:
$$f(x) = 4 - \sin\left(2x - \frac{\pi}{3}\right)$$

9. Verify the following identity:

$$\sin\theta + \cos\theta = \frac{\sin\theta}{1 - \cot\theta} + \frac{\cos\theta}{1 - \tan\theta}$$

10. Verify the following identity:

$$\frac{\sin(s+t)}{\cos s \cos t} = \tan s + \tan t$$

11. Verify the following identity:

$$\sin(x + y) + \sin(x - y) = 2\sin x \cos y$$

12. Verify the following identity:

$$\frac{\tan\varphi}{1+\cos\varphi} + \frac{\sin\varphi}{1-\cos\varphi} = \cot\varphi + \sec\varphi\csc\varphi$$

13. Verify the following identity:

$$\cos(2x) = \frac{\cot^2 x - 1}{\cot^2 x + 1}$$