MTH 1000, Exam 3 Name: _____

Time: 75 minutes, Max Points: 100 [+5 Bonus]

Print your name clearly. Show **all work clearly** and in order. Use of books, notes, calculators, or any other resource is **not** permitted. Attach additional pages of work if necessary.

1. [4 points] Convert the two angle measurements into radians.

   (a) $50° =$

   (b) $2\pi° =$

2. [4 points] Convert the two angle measurements into degrees.

   (a) $\frac{\pi}{9}$ rad $=$

   (b) $\frac{1}{2}$ rad $=$

3. [24 points] Fill in the table.

θ	$\sin\theta$	$\cos\theta$	$\tan\theta$
$0°$			
$30°$			
$45°$			
$60°$			
$90°$			
$180°$			
$270°$			
$360°$			

4. [24 points] Find the exact value of the following trigonometric functions.

$\sec(180°)$ $\csc(-300°)$ $\cot(-45°)$

$\sin(300°)$ $\tan(120°)$ $\cos(135°)$

$\sin\left(\frac{3\pi}{4}\right)$ $\tan\left(\frac{2\pi}{3}\right)$ $\sec\left(\frac{-\pi}{4}\right)$

$\cos(-\pi)$ $\csc\left(\frac{\pi}{2}\right)$ $\cot(\pi)$

5. [8 points] Determine the quadrant of each angle.

$\theta = -120°$

$\theta = -\frac{3\pi}{8}$

$\theta = 550°$

$\theta = \frac{19\pi}{10}$

6. [10 points] If $\csc(\theta) = 2$ and $\cos(\theta) > 0$, find the value of the other 5 trig functions at θ.

7. [4 points] If $\sec(\theta) = -\frac{3}{2}$, what are the possible values for $\sin(\theta)$?

8. [11 points] Find the period, amplitude, x-intercepts, coordinates of all local minimums, and coordinates of all local maximums of $f(x) = -2\cos\left(3x + \frac{\pi}{2}\right) + 2$. Then, sketch the graph of at least two periods of the function.

9. [11 points] Find the period, x-intercepts, coordinates of all local minimums, coordinates of all local maximums, and locations of vertical asymptotes of $f(x) = -\cot(2x + \pi)$. Then, sketch the graph of at least two periods of the function.

Bonus [+5 points] Euler's formula states $e^{ix} = \cos x + i \sin x$, where i is the imaginary unit. Use this formula to show the two identities below.

$$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta \tag{1}$$

$$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta \tag{2}$$

[*Hint.* Consider $x = \alpha + \beta$.]