Quiz Date: Nov 29, 2017

**Instructions:** The following exercises are similar to those found in the course text book. This homework is not due for a grade, but you should know how to do all of them and be able to show your work for each. You can expect at least one of these problems to appear on an in-class quiz on the date listed above.

# 9.2 - Calculus with Parametric Curves

**1.** Find the slope of the tangent line to the parametric curve $x = t - \frac{1}{t}$, $y = 1 + t^2$ at the point $t = 1$.

**2.** Given the parametric curve $x = e^{\sin\theta}$, $y = e^{\cos\theta}$, find the $t$-values where the tangent line(s) are horizontal and vertical.

**3.** Find the length of the parametric curve $x = e^t + e^{-t}$, $y = 5 - 2t$ on the interval $0 \le t \le 3$.

**4.** Find the area enclosed by the $x$-axis and the parametric curve $x = 1 + e^t$, $y = t - t^2$.

# 9.3 - Polar Coordinates

**5.** Each of the following points is given in polar coordinates $(r, \theta)$. Find the Cartesian coordinates $(x, y)$ for each point.

**a.** $(1, \pi)$

**b.** $(2, -2\pi/3)$

**c.** $(-2, 3\pi/4)$

**6.** Find a Cartesian equation for the polar curve $r = \tan\theta \sec\theta$.

**7.** Find a polar equation for the Cartesian curve $xy = 4$.

**8.** Find the slope of the tangent line to the polar curve $r = 1/\theta$ at the point where $\theta = \pi$.

# 9.4 - Areas and Lengths in Polar Coordinates

**9.** Find the area of the region that lies inside of $r = 1 - \sin\theta$ and outside of $r = 1$.

**10.** Find the area of the region that lies inside of both $r = \sqrt{3}\cos\theta$ and $r = \sin\theta$.

**11.** Find the area of the region enclosed by one loop of the curve $r = 2\cos\theta - \sec\theta$.

**12.** Find the length of the polar curve $r = \theta^2$ on the interval $0 \le \theta \le 2\pi$.