Worksheet #3; date: 01/23/2018
MATH 53 Multivariable Calculus

1. *(Stewart 10.3.57)* Find the slope of the tangent line to the polar curve

$$r = 1/\theta$$

at the point $\theta = \pi$.

2. *(Stewart 10.3.59)* Find the slope of the tangent line to the polar curve

$$r = \cos 2\theta$$

at the point $\theta = \pi/4$.

3. *(Stewart 10.3.63)* Find the points on the curve

$$r = 1 + \cos\theta$$

where the tangent line is horizontal or vertical.

4. *(Stewart 10.2.33)* Find the area enclosed by the x-axis and the curve $x = t^3 + 1$, $y = 2t - t^2$.

5. *(Stewart 10.2.39)* Set up an integral that represents the length of the curve.

$$x = t - 2\sin t, \quad y = 1 - 2\cos t, \quad 0 \le t \le 4\pi.$$

6. *(Stewart 10.2.63)* Find the exact area of the surface obtained by rotating the curve

$$x = a\cos^3\theta, \quad y = a\sin^3\theta, \quad 0 \le \theta \le \pi/2.$$

about the x-axis.

7. *(Stewart 10.4.5; modified)* Find the area enclosed by the polar curve

$$r^2 = \sin 2\theta.$$

8. *(Stewart 10.4.31)* Find the area of the region that lies inside both curves

$$r = \sin 2\theta, \quad r = \cos 2\theta.$$

9. *(Stewart 10.4.47)* Find the exact length of the polar curve

$$r = \theta^2, \quad 0 \le \theta \le 2\pi.$$