Assignment #11 ***Math 181*** ***Name:***

1. Convert the following polar coordinate to rectangular coordinate:

   a) $r^3 = 3r\cos\theta - \sin\theta$

   b) $r = \dfrac{3}{2\cos\theta - 5\sin\theta}$

2. Find a rectangular coordinate equation of tangent line to polar coordinate:

   $r = 2 + 2\cos(\theta)$ at $\theta = \dfrac{\pi}{3}$

3. Sketch the graph of the following functions in polar coordinate:

a) $r = \theta^2$

b) $r = 2 - 2\sin(\theta)$

c) $r^2 = -25\cos(2\theta)$

d) $r = 3 - 7\cos(\theta)$

e) $r = 4 - 2\sin(\theta)$

f) $r^2 = -4\sin(2\theta)$

4. For the following functions in polar coordinate. Sketch and then setup integrals for area:
   i) Inside r1 and outside r2
   ii) Inside r2 and outside r1
   iii) Inside both r1 and r2

   a) $r_1 = 10\sin(2\theta)$ *and* $r_2 = 5$

   b) $r_1 = 4\cos(\theta)$ *and* $r_2 = 4 - 4\cos(\theta)$

c) $r_1 = 2 - 2\sin(\theta)$ *and* $r_2 = 2$

5. Find the area enclosed by the following curves:

a) $r = 5\sin(2\theta)$

b) Inner loop of $r = 8 - 16\sin(\theta)$

6. Find the arc-length of the curves in polar coordinate:

a) $r = \dfrac{e^{\theta}}{\sqrt{2}}$ *for* $0 \le \theta \le \pi$

b) $r = a\sin^2\left(\frac{\theta}{2}\right)$ *for* $0 \le \theta \le \pi$ *and* $a > 0$

7. Find the area of the surfaces generated by revolving the curve $r = \sqrt{2}e^{\theta/2}$ *for* $0 \le \theta \le \frac{\pi}{2}$ *about* $x-axis$.