PROBLEM SET 2

MATH 2019 – SPRING 2008

1. Find the arc length of the curve described by the parametric equations.

   (a) $x = \dfrac{(2t+3)^{3/2}}{3}, \quad y = t + \dfrac{t^2}{2}, \quad 0 \le t \le 3$

   (b) $x = (4\sqrt{2})t^{1/2}, \quad y = t - \ln t^2, \quad 1 \le t \le 3$

   (c) $x = t^2 + 1, \quad y = 4t^3 + 3, \quad 0 \le t \le 1$

   (d) $x = e^t + e^{-t}, \quad y = 5 - 2t, \quad 0 \le t \le 3$

2. Find the slope of the polar curve $r = 3 + 3\cos\theta$ at $\theta = \pi/4$.

3. Find the area inside one petal of $r = 4\cos 23\theta$.

4. (a) Find the area of the region inside $r = 2\sin 12\theta$ and outside $r = \sqrt{2}$.

   (b) Find the area of the common interior.

5. (a) Find the area inside the inner loop of $r = 1 + 2\sin\theta$.

   (b) Find the area of the region between the inner and outer loops.

6. (a) Find the area of the region inside $r = 3\cos\theta$ and outside $r = 1 + \cos\theta$.

   (b) Find the area of the region inside $r = 1 + \cos\theta$ and outside $r = 3\cos\theta$.

   (c) Find the area of the common interior.

7. (a) Find the area of the region inside $r^2 = 8\cos 2\theta$ and outside $r = 2$.

   (b) Find the area of the common interior.

On problems 4b, 5b, 6bc, and 7b, it's enough to just set up the integrals. However, you should work problems 3, 4a, 5a, 6a, and 7a all the way through.