Math 116 Homework 3

Directions: Except where indicated, merely finding the answer to a problem is not enough to receive credit. You must show how you arrived at that answer. DO NOT convert roots or transcendentals like e into a decimal approximation; just leave them as they are.

1) Find an equation in x and y that describes the parametric curve, then graph it and indicate the direction of increasing t.

a) $f(t) = \langle \ln(e^2 t), \sqrt{t} \rangle$, $t \geq 1$

b) $f(t) = \langle 7\sin(t), 9\cos(t) \rangle$, $0 \leq t \leq \pi$

2) Find the equation of the tangent line to $f(t) = \langle \cot(t), \csc(t) \rangle$ at the point $(1/\sqrt{3}, 2/\sqrt{3})$.

3) Calculate the arclength of $f(t) = \langle 4t - 17, e^{2t} + e^{-2t} \rangle$ from $t = 0$ to $t = \ln(13)$.

4) Establish an equation in polar coordinates for the curve $x^2 + y^2 = 4y - 2x$.

5) Find all points (x, y) in rectangular (Cartesian) coordinates where the tangent line to $r = 1 + \sin(\theta)$ is vertical or horizontal.

6) Calculate the indicated area.

a) from $\theta = -\pi/4$ to $\theta = \pi/3$ inside $r = \cos(\theta)$

b) inside both $r = 11 + 6\sin(\theta)$ and $r = 11 + 6\cos(\theta)$.

c) inside one loop of $r = \sqrt{\sin(4\theta)}$.

7) Find the length of the polar curve $r = 2\theta^2$ from $\theta = 0$ to $\theta = \pi$.