

HW 5, MA 1023

Due 2/21

1. Find the Cartesian equations for the following parametric curves and sketch these curves in the  $xy$ -plane.

$$1) \quad x = 2t - 5, \quad y = 4t - 7 \quad -\infty < t < \infty$$

$$2) \quad x = \cos(t) + 4, \quad y = \sin(t) - 2 \quad 0 \leq t \leq 2\pi$$

In exercise 2-3,

1) Find an equation of the tangent line to the given curve at the point defined by the value of  $t$ .

2) Find the value of  $\frac{d^2y}{dx^2}$  at this point.

2.

$$x = 2t^2 + 3, \quad y = t^4 \quad t = -1$$

3.

$$x = \frac{1}{t+1}, \quad y = \frac{t}{t-1} \quad t = 2$$

In exercise 4-6, find the length of the curves.

4.

$$x = e^t \cos t, \quad y = e^t \sin t \quad 0 \leq t \leq \pi$$

5.

$$x = 1 + 3t^2, \quad y = 4 + 2t^3 \quad 0 \leq t \leq 1$$

6.

$$x = e^t + e^{-t}, \quad y = 5 - 2t \quad 0 \leq t \leq 3$$

7. Graph the sets of points in  $xy$ -plane whose polar coordinates satisfy the equations and inequalities.

1)  $0 \leq \theta \leq \pi, r = 2$ ;

2)  $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}, 1 \leq r \leq 2$ .

8. 1) Sketch the region bounded by the polar curve  $r = 2 \sin \theta$  and  $\frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$ .

2) Find the area of the above region.