

QUIZ 5 (CHAPTER 13)**MATH 151 – SPRING 2004 – KUNIYUKI
105 POINTS TOTAL, BUT 100 POINTS = 100%****Show all work, simplify as appropriate, and use “good form and procedure” (as in class).****Box in your final answers!****No notes, books, or calculators allowed.**

When graphing, be reasonably accurate, and clearly indicate orientation.

Use as many arrowheads as appropriate. Clearly indicate x - and y -intercepts, endpoints, and extreme points when feasible.1) A plane curve C is described by:

$$x = 8 \cos t + 2$$

$$y = 6 \sin t - 4$$

$$0 \leq t < 2\pi$$

Find a corresponding rectangular equation in x and y . (7 points)

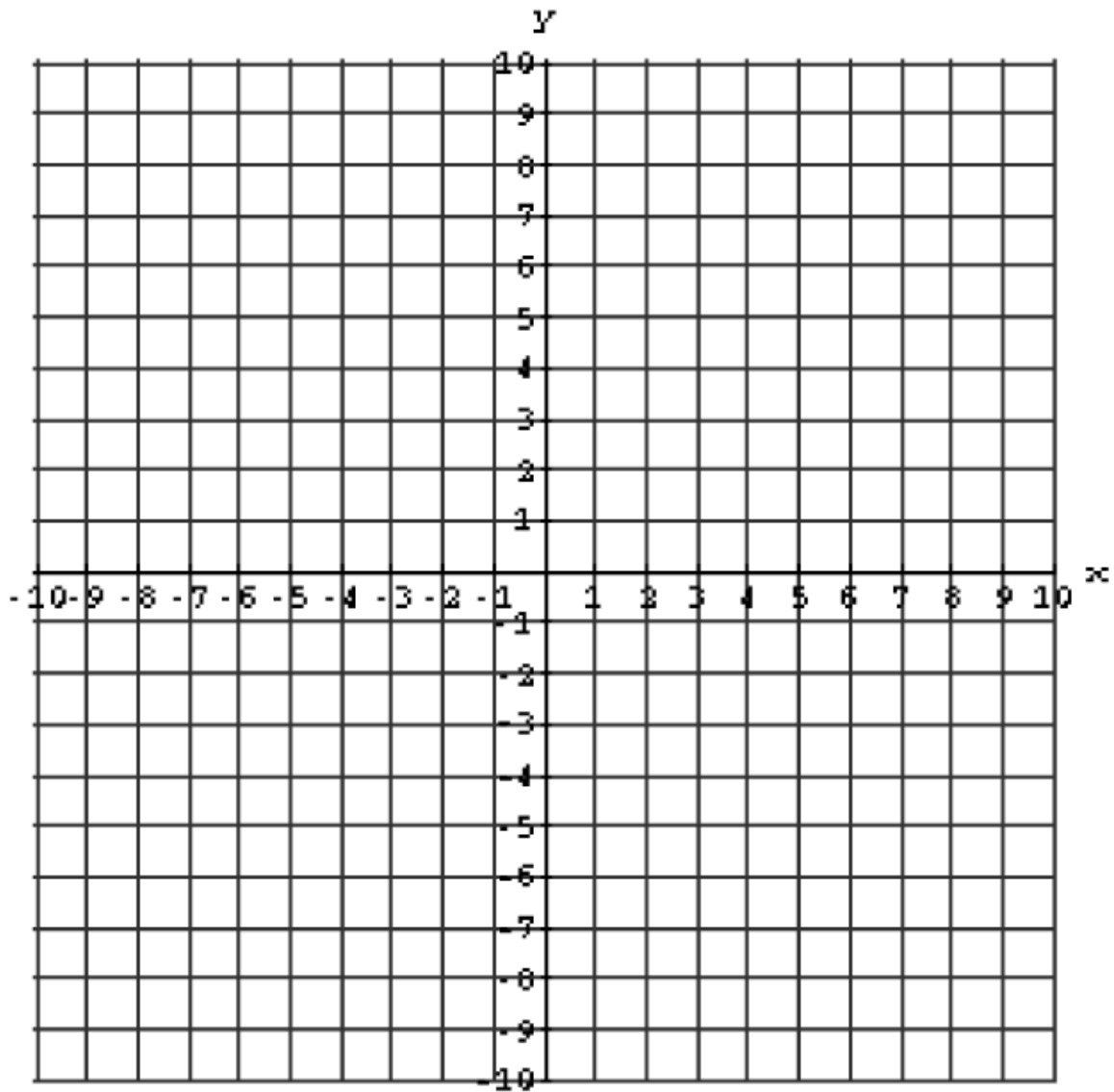
2) A plane curve C is described by:

$$x = -2 \sin t$$

$$y = 4 + 2 \sin t$$

$$0 \leq t \leq \pi$$

Sketch the graph of C using the grid below. Use arrowheads and labels to clearly indicate orientation for any relevant value of t . (10 points)



3) (For parts a) through e.) A plane curve C is described by:

$$x = e^{4t}$$

$$y = 2t^3 - 1$$

$$-5 \leq t \leq 10$$

(38 points total)

a) Find the slope of the tangent line at the point on the curve that corresponds to $t = 2$.

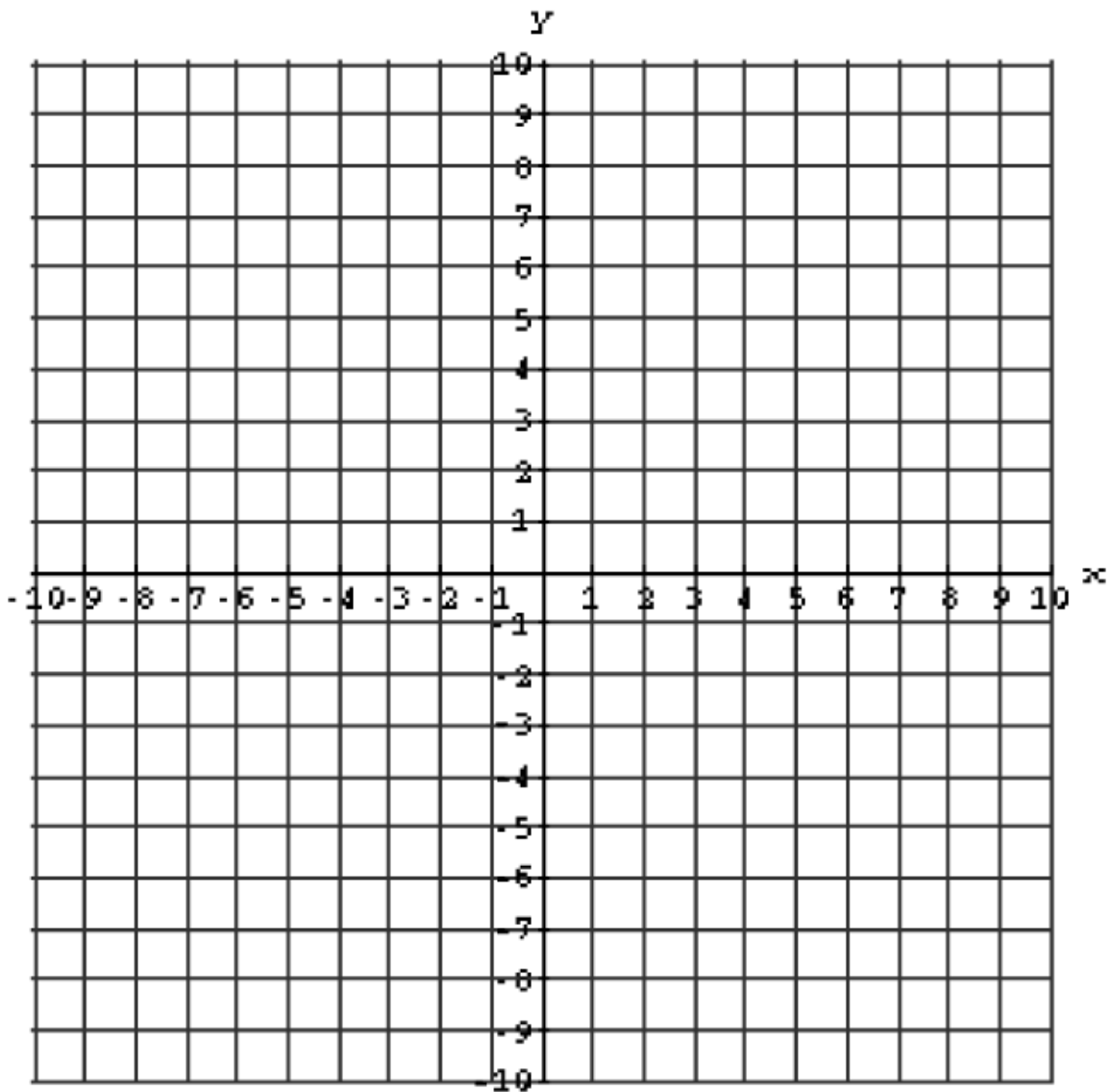
b) Find the point(s) on C at which the tangent line is horizontal. If there are none, write "NONE." Box in your final answer(s).

c) Find the point(s) on C at which the tangent line is vertical. If there are none, write "NONE." Box in your final answer(s).

d) Set up, **but do not evaluate**, an integral that represents the length of C . Don't leave any general notation that can be replaced by something more specific.

e) Find $\frac{d^2y}{dx^2}$ in terms of t . Simplify completely.

- 4) Sketch the graph of $r = 4 + 6 \sin \theta$ using the grid below. You must first carefully graph r against θ as Cartesian/rectangular coordinates; identify key values of r and θ , as in class. You do not have to determine the exact value(s) of θ for which $r = 0$. (20 points)



5) Find the slope of the tangent line to the graph of the polar equation

$$r = 4 + 6 \sin \theta \text{ (same as in Problem \#4) at the point corresponding to } \theta = \frac{\pi}{6}.$$

Give an exact answer. (18 points)

6) Find the area of the region $R = \left\{ (r, \theta) : 0 \leq \theta \leq \frac{\pi}{6}, 0 \leq r \leq 3 \cos \theta \right\}$. (12 points)