MATH 009C **PRACTICE MIDTERM** **July 12, 2018**

Name: _____ **Score:** _____ / 100

Student ID: _____

DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO

	1	2	3	4	5	Total
✓						
Score						
Pts. Possible	10	10	10	10	10	45

INSTRUCTIONS FOR STUDENTS

- You can use both sides of the paper for your solution. This is an **4** question exam.
- Students have **50** minutes to complete the exam.
- The test will be out of **40** points (4 questions). You may attempt a 5^{th} question, which will have a maximum of 5 possible points. The highest possible score is therefore **45** points.
- In the above table, the row with the ✓, is for you to keep track of the problems you are attempting/completing. Write a ✓ for the problems you want to be graded for credit, and EC for the extra credit problem.
- You may complete parts of problems, as partial credit will be given based on correctness, completeness, and ideas that are leading to the correct solutions.
- **PLEASE SHOW ALL WORK**. Any unjustified claims will receive no credit.
- No notes, textbooks, phones, calculators, etc. are allowed for the exam.
- The last page of the test can be used for scratch work.

GOOD LUCK!

1) (8 pts.) (a) Eliminate the parameter in the for the following parametric equation

$$x = 9\cos(t) + 1 \quad y = 4\sin(t) + 2$$

(2 pts.) (b) Identify the type of graph from your result in part (a).

2) Consider the parametric defined as: $x = 4 + t^2, y = t^2 + t^3$

(3 pts.) (a) Compute $\dfrac{dy}{dx}$.

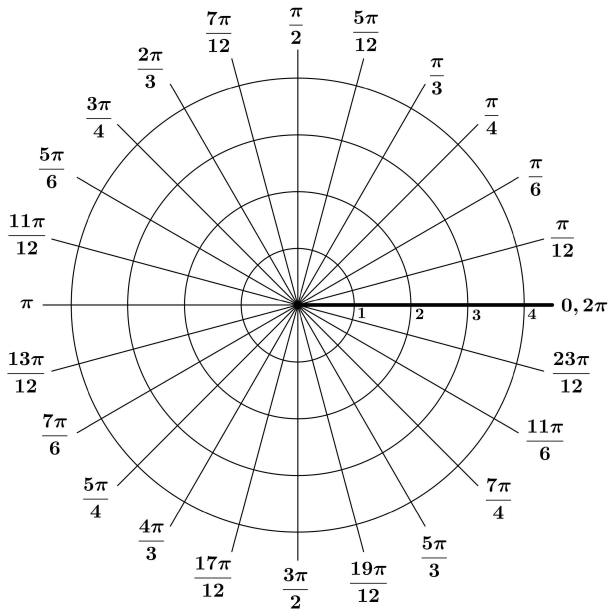
(4 pts.) (b) Compute $\dfrac{d^2y}{dx^2}$.

(3 pts.) (c) For which values of t is the curve concave upward?

3) (5 pts.) (a) Sketch the following polar curve on the polar graph paper below:

$$r = 1 + 3\sin(\theta)$$

(5 pts.) (b) Consider the polar curve from part (a). Find the slope of the tangent line to the curve at the point $\theta = \dfrac{3\pi}{2}$.



4) Consider the polar curve $r = 1 + \sin(\theta)$.

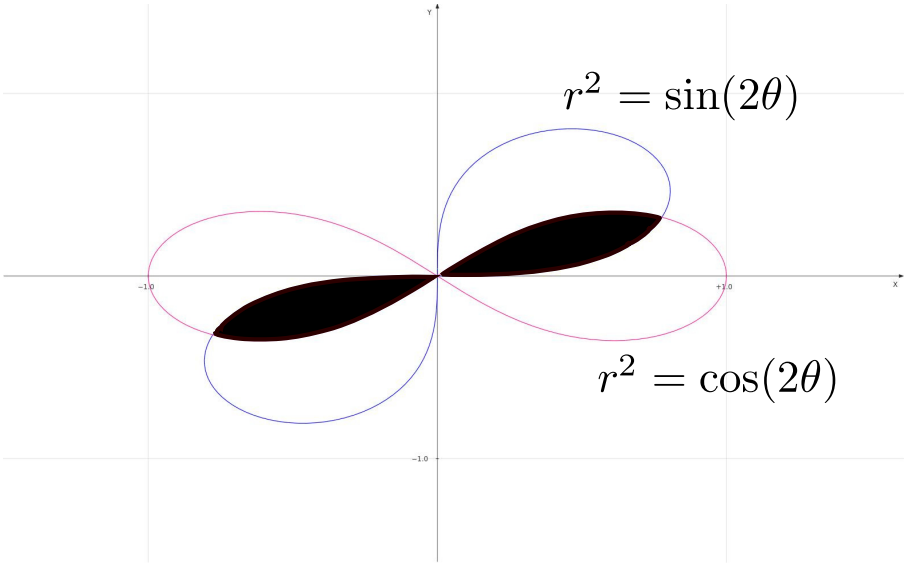
(5 pts.) (a) Find the values of θ where the tangent line is horizontal for $0 \leq \theta < 2\pi$.

(5 pts.) (b) Find the values of θ where the tangent line is vertical for $0 \leq \theta < 2\pi$.

NOTE: *You do not need to consider the* $\frac{0}{0}$ *case. If a value of* θ *gives* $\frac{dy}{dx} = \frac{0}{0}$, *state that the slope of the tangent line is indeterminate.*

5) (10 pts.) Find the area of the region that lies between the petals (the region is shaded in the labeled plot below).

$$r^2 = \cos(2\theta)$$
$$r^2 = \sin(2\theta)$$



THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK

END OF TEST