

Score:

Name: _____

Section (circle one): 1 2 3 4 5 6

Team (circle one): a b c d e f

SM212 – Test 3 - Fall 2010

1. (10 pts) Convert the following points as indicated:

a. Rectangular \rightarrow Polar: $(1, \sqrt{3})$

b. Rectangular \rightarrow Polar: $(1, -\sqrt{3})$

c. Rectangular \rightarrow Polar: $(-1, \sqrt{3})$

d. Polar \rightarrow Rectangular: $(1, 0)$

e. Polar \rightarrow Rectangular: $(\sqrt{3}, \frac{2\pi}{3})$

No marks on this table	
1 (10pts)	
2 (10 pts)	
3 (10 pts)	
4 (10 pts)	
5 (10 pts)	
6 (10 pts)	
7 (10 pts)	
8 (10 pts)	
9 (20 pts)	
cumm.	

2. (10 pts) Express the function $x^2 + (y - 2)^2 = 4$ as a polar function $r = f(\theta)$.

3. (10 pts) Find the area the is enclosed within a single leaf of the graph $r = \sin (5\theta)$.

Name: _____

4. (10 pts) Solve: $\frac{dx}{dt} = xt + t$, $x(0) = 2$.

5. (10 pts) Solve: $\frac{dy}{dx} = x - y$, $y(0) = -1$.

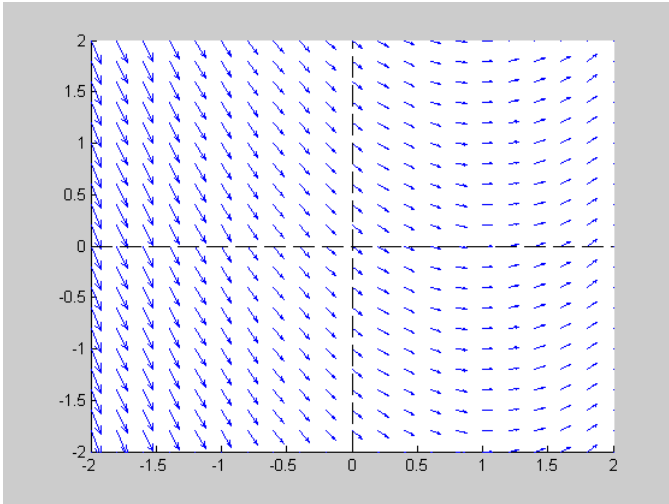
6. (10 pts) Given the following differential equation: $\frac{dy}{dt} = y^2 + e^t$, $y(0) = \frac{1}{2}$. Using Euler's method approximate $y(.3)$. Use a step size $\Delta t = .1$ and an accuracy of 3 decimal places.

Name: _____

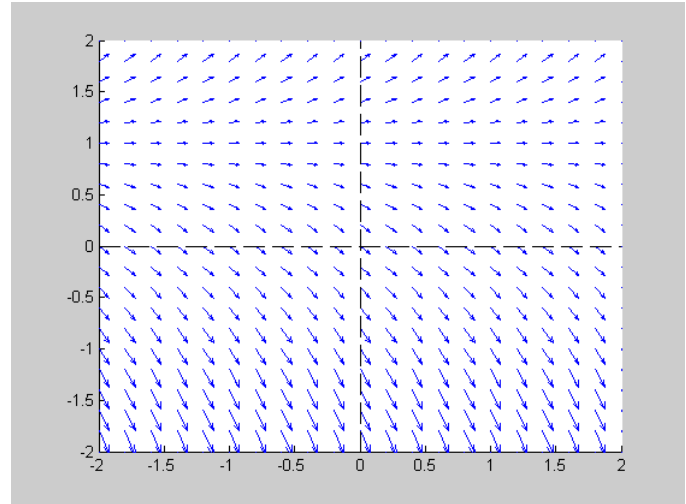
7. (10 pts) Match the differential equation with the direction field below (you may use your calculator for this problem):

Differential Equation	Direction Field	Differential Equation	Direction Field
1. $y' = x - 1$		3. $y' = y - 1$	
2. $y' = y - x$		4. $y' = y^2 - x^2$	

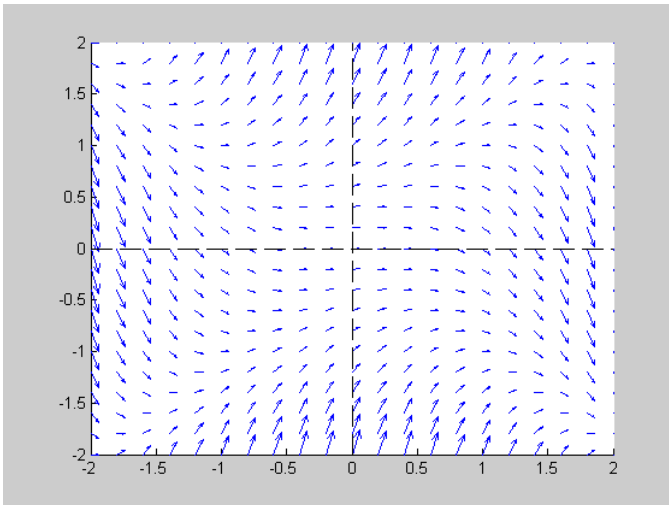
I



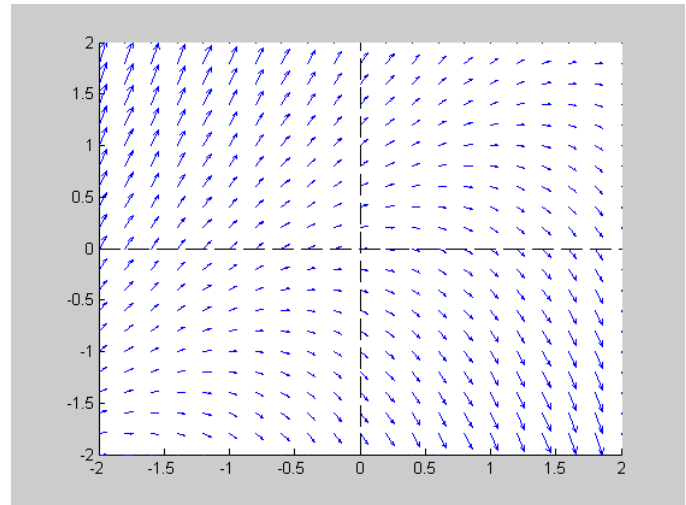
II



III



IV



8. (10 pts) In each of the direction fields above, sketch the graph of the solution that satisfies the initial condition $y(0) = -1$.

9. (20 pts) Given the following population data propose a logistics population model for the system. What does you model predict that the population will be at $t = 15$. Recall that the logistic model is given by $\frac{dP}{dt} = kP \left(1 - \frac{P}{M}\right)$.

t	P
0	2.00
5	3.75
10	4.65
15	4.92
20	4.98
25	5.00
30	5.00