

Math 126 - Spring 2010

Exam 1

April 22, 2010

Name: _____

Section: _____

Student ID Number: _____

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- You are allowed to use a scientific calculator (**NO GRAPHING CALCULATORS**) and one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.
- Check that your exam contains all the problems listed above.
- Clearly put a box around your final answers and cross off any work that you don't want us to grade.
- Show your work. The correct answer with no supporting work may result in no credit. Guess and check methods are not sufficient, you must use appropriate methods from class.
- Unless otherwise indicated, your final answer should be given in exact form whenever possible and correct to two digits if given as a decimal.
- Cheating will not be tolerated. Keep your eyes on your exam!
- You have 50 minutes to complete the exam. Use your time effectively, spend less than 10 minutes on each page and make sure to leave plenty of time to look at every page. Leave nothing blank, show me what you know!

GOOD LUCK!

1. (10 points) Consider the triangle determined by the points $P(1, 0, -2)$, $Q(0, 2, 3)$, and $R(1, 1, 1)$.
- (a) (4 pts) Find the equation of the plane through P , Q , and R .
(Give your answer in the scalar form $ax + by + cz + d = 0$.)
- (b) (4 pts) Find the angle of the triangle at Q .
That is, find the angle between the two vectors \overrightarrow{QP} and \overrightarrow{QR} .
(Give your final answer as a decimal to the nearest degree.)
- (c) (2 pts) Find the area of the triangle.

2. (10 points)

(a) (4 pts) Find parametric equations for the line through the point $(1,0,2)$ and orthogonal to the plane $3x - 2y + z = 4$.

(b) (6 pts) Find all points where the sphere $x^2 + y^2 - 2y + z^2 = 8$ intersects the line through the points $(0,1,0)$ and $(8,5,1)$.

3. (10 points)

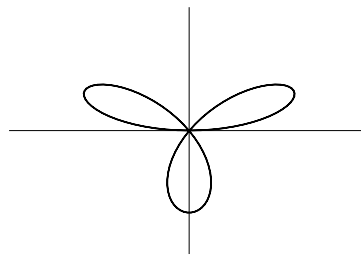
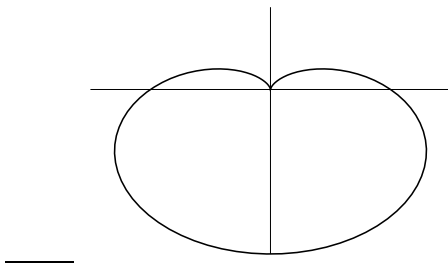
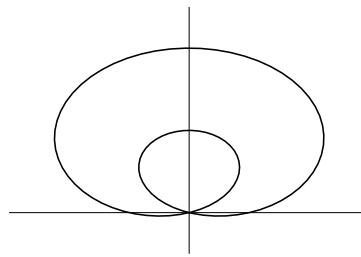
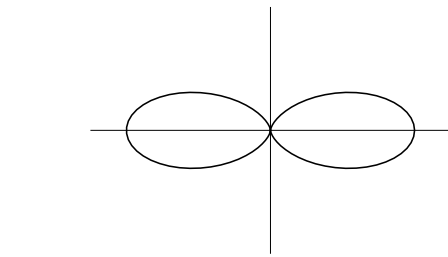
- (a) (6 pts) Find the equation of the tangent line to the polar curve $r = 3 - 3\sin(\theta)$ at $\theta = \pi$. Put your answer in the form $y = mx + b$.

- (b) (4 pts) Match the polar equations to the correct graphs. Put the number of the equation next to the correct picture in the blanks provided. (There is one extra picture that won't be labeled).

1. $r = 3 - 3\sin(\theta)$

2. $r = 1 + \cos(2\theta)$

3. $r = \sin(3\theta)$



4. (10 points) For $t > 0$, consider the curve given by vector function $\mathbf{r}(t) = \left\langle \frac{8}{t}, 12\sqrt{t}, t^2 \right\rangle$.

(a) (4 pts) Find the unit tangent at $t = 2$.

(b) (6 pts) Find parametric equations for the tangent line to the curve at the point $(2, 24, 16)$.

5. (10 points) A baseball player named Franklin is running on a coordinate system. His location (x, y) at time t seconds is given by the parametric equations

$$x = 6 + t^3, \quad y = 5 + \frac{3}{2}t^2.$$

- (a) (4 pts) Evaluate $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $t = 1$.

- (b) (6 pts) Franklin runs along the parametric curve from the point $(6,5)$ to the point $(14,11)$. Find the distance traveled along the curve between these two points. (Set up and evaluate)