

Math 126, Section D, Spring 2008, Midterm II

May 15, 2008

Name _____

TA/Section _____

Instructions.

- There are 4 questions. The exam is out of 40 points.
- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting.
- You may use a calculator which does not graph and which is not programmable. Even if you have a calculator, give me exact answers. ($\frac{2\ln 3}{\pi}$ is exact, 0.7 is an approximation for the same number.)
- **Show your work.** If I cannot read or follow your work, I cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work. If you continue at the back of a page, make a note for me. Please BOX your final answer.

Question	points
1	
2	
3	
4	
Total	

1. Sketch the region bounded by

$$z = 3x^2 + y^2 \quad \text{and} \quad z = 6 - 3x^2 - y^2$$

and find parametric equations for the intersection of the two surfaces. (3+6 points)

2. For the curve given by

$$\vec{r}(t) = \langle 4 \sin t, 3t, 4 \cos t \rangle$$

(a) Find the unit tangent vector $\vec{T}(t)$. (3 points)

(b) Find the unit normal vector $\vec{N}(t)$. (3 points)

(c) Find parametric equations for the tangent line to the curve at the point $(2, \frac{\pi}{2}, 2\sqrt{3})$. (3 points)

(d) Find the equation of the normal plane to the curve at the point $(2, \frac{\pi}{2}, 2\sqrt{3})$. (3 points)

3. Sketch the graph of the curve

$$x = e^t \cos t$$

$$y = e^t \sin t,$$

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

marking the x and y intercepts and find its length. (4+5 points)

4. (a) Match the following polar curves with their graphs. (1 point each)

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

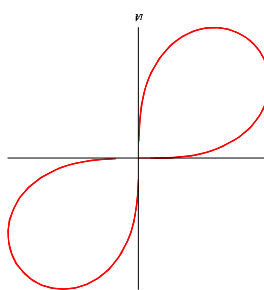
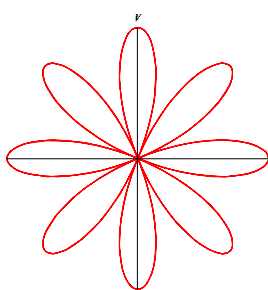
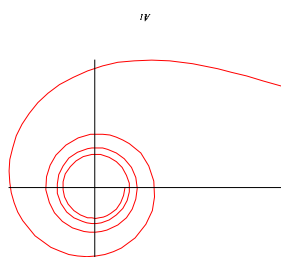
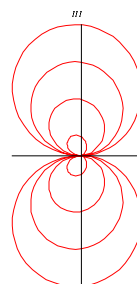
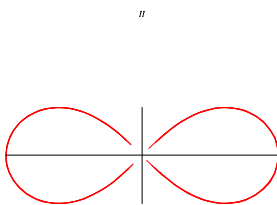
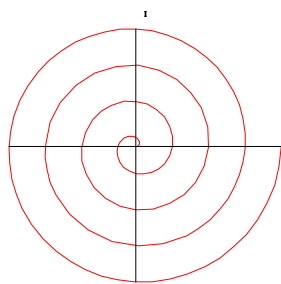
$$r = \theta$$

$$r = \cos(4\theta)$$

$$r = \frac{1}{\sqrt{\theta}}$$

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

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



(b) Find the equation of the tangent line to $r = \theta \sin(\theta)$ at the point $(\frac{\pi}{2}, \frac{\pi}{2})$. (4 points)