Math 126 - Spring 2011
Exam 1
April 21, 2011

Name: _____

Section: _____

Student ID Number: _____

PAGE 1	12	
PAGE 2	15	
PAGE 3	11	
PAGE 4	12	
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. (12 points)

(a) Find the **equation of the plane** containing the two lines given by the parametric equations

$$L1: \begin{cases} x = 7 - 2t \\ y = 5 + t \\ z = 8 \end{cases} \qquad L2: \begin{cases} x = 7 + 4t \\ y = 5 - 3t \\ z = 8 + t \end{cases}$$

(b) Consider the line, L, that is orthogonal to the plane $x - z + 7 = 0$ and through the point $(0, 1, 4)$. Find **an equation for the line**, then find all points where the line intersects the surface $z = x^2 + 2y^2$.

2. (5 pts) Consider the surface $z = x^2 + 2y^2$.

   (a) Describe the traces parallel to the given plane (no work needed, just circle your answers).

      i. Parallel to the yz-plane (when x is fixed):
      PARABOLAS CIRCLES ELLIPSES HYPERBOLAS NONE OF THESE

      ii. Parallel to the xz-plane (when y is fixed):
      PARABOLAS CIRCLES ELLIPSES HYPERBOLAS NONE OF THESE

      iii. Parallel to the xy-plane (when z is fixed, $z > 0$):
      PARABOLAS CIRCLES ELLIPSES HYPERBOLAS NONE OF THESE

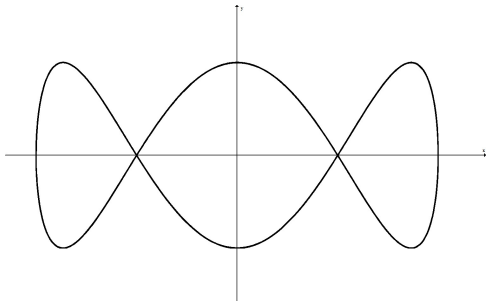
   (b) Clearly circle the name of the surface given by $z = x^2 + 2y^2$:

CONE	SPHERE	ELLIPSOID
PARABOLIC CYLINDER	CIRCULAR CYLINDER	ELLIPTICAL CYLINDER
HYPERBOLIC CYLINDER	HYPERBOLOID	CIRCULAR PARABOLOID
ELLIPTIC PARABOLOID	HYPERBOLIC PARABOLOID	NONE OF THESE

3. (10 points) Olivo is running on a path. His location (x, y) (each in feet) at time t seconds is given by the vector function

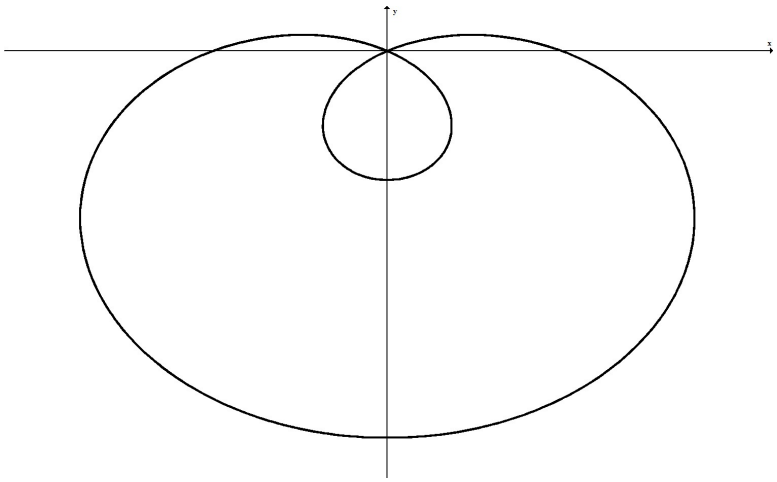
$$\mathbf{r}(t) = \langle x(t), y(t) \rangle = \langle \cos(\pi t),\ \sin(3\pi t) \rangle .$$

   (a) Find the equation for the tangent line at $t = 1/3$.



   (b) Find all three values of x at which the path has horizontal tangents.

4. (11 pts) Consider the polar curve given by the equation $r = 3 - 6\sin(\theta)$. The graph of the curve is given below.



(a) Give the value of all y-intercepts.

(b) Find the equation for the tangent line at the point on the curve corresponding to $\theta = \pi$. (Give your answer in the form $y = mx + b$.)

5. (12 points) The motion of a particular fly in three-dimensions is described by the vector position function $\mathbf{r}(t) = \left\langle t^2, t-4, -8+32\sqrt{4+t} \right\rangle$.

   (a) Find the curvature at $t = 0$.

   (b) Find the location, (x, y, z), where the tangent line to the curve at $t = -3$ intersects the xy-plane.