Math 126C **First Midterm** **Winter 2009**

Your Name

Your Signature

Student ID #

	Luke		Chris	
Section	11:30	12:30	11:30	12:30
(circle one)	CA	CB	CC	CD

Problem	Total Points	Score
1	5	
2	5	
3	8	
4	6	
5	12	
6	8	
7	6	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Graphing calculators are not allowed.
- Do not share notes.
- In order to receive credit, you must show your work. Explain why your answers are correct.
- **Place a box around $\boxed{\text{YOUR FINAL ANSWER}}$ to each question.**
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1 (5 points) Calculate the equation of the tangent line to the curve $r = 1 + 2\cos(\theta)$ at the point where $\theta = \pi/2$. Give your equation in terms of x and y.

2 (5 points) Compute the distance from the point $(3, 2, 1)$ to the plane $x + 2y + 3z = 1$.

3 (8 points) Compute parametric equations for the line that contains the point $(-1, 2, -3)$ and is parallel to both of the planes $2x - y = 3$ and $x - 2y + 3z = 2$.

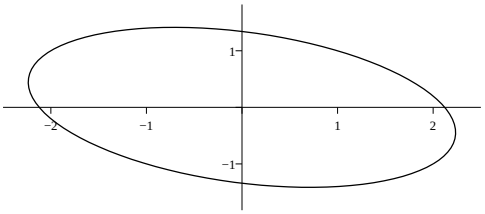
4 (6 points) Find a vector function $\mathbf{r}(t)$ that represents the curve of intersection of the surfaces $4x^2 + (z-1)^2 = 9$ and $y = 3x^2$.

5 (12 points) Let $\mathbf{r}(t) = \langle\, t^3, t^2, t^3 - 2t \,\rangle$.

(a) (6 points) Compute the curvature κ at the point $(-1, 1, 1)$.

(b) (6 points) Find the arclength of this curve between the points $(-1, 1, 1)$ and $(1, 1, -1)$. Set up the integral, but do not evaluate.

6 (8 points) Find the exact coordinates of the lowest point on the curve in $\mathbf{R}^2$ given by the parametric equations $x = 2\cos(t) + \sin(t), \quad y = \sin(t) - \cos(t)$.



7 (6 points) A particle in $\mathbf{R}^3$ has position function $\mathbf{r}(t) = \langle 2t^3 + 1, t^2, 3t - t^2 \rangle$. Find the speed of the particle when $t = 2$.