Math 126C **Second Midterm** **Autumn 2004**

Your Name

Your Signature

Student ID #

	Wendy		Keir	
Section	1:30	2:30	1:30	2:30
(circle one)	CA	CB	CC	CD

Problem	Total Points	Score
1	10	
2	12	
3	8	
4	8	
5	12	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- 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 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 (10 points) Determine whether the statement is true or false. There is no partial credit on this problem.

(a) (2 points) $(\mathbf{i}+\mathbf{k})\times(\mathbf{i}-\mathbf{k})$ is a unit vector.

(b) (2 points) Let $x=f(t)$ and $y=g(t)$ be a parametric curve in $\mathbf{R}^2$. If $g'(2)=0$ then the curve has a horizontal tangent when $t=2$.

(c) (2 points) For any vectors $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ in $\mathbf{R}^3$,

$$\mathbf{a}\times(\mathbf{b}\times\mathbf{c})=(\mathbf{a}\times\mathbf{b})\times\mathbf{c}.$$

(d) (2 points) If $\mathbf{r}(t)$ is a differentiable vector function, then

$$\frac{d}{dt}\,|\,\mathbf{r}(t)\,|=|\,\mathbf{r}'(t)\,|\,.$$

(e) (2 points) Let C be the curve in $\mathbf{R}^3$ defined by the vector function

$$\mathbf{r}(t)=3\sin(2t-1)\mathbf{j}+3\cos(2t-1)\mathbf{k}.$$

There is a point on C where the curvature is zero.

2 (12 points) Consider the plane $3x - 2y + z = 5$ and the line $\dfrac{x-2}{3} = \dfrac{y-3}{3} = z - 1$.

(a) (3 points) Is the line perpendicular to the plane?

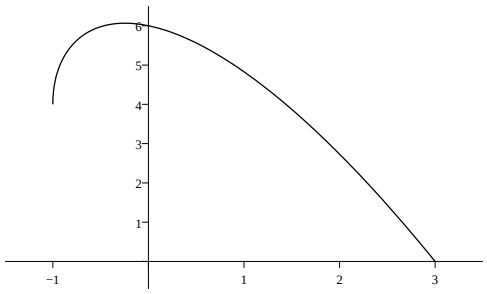
(b) (4 points) Find their point of intersection.

(c) (5 points) Find all points on the line that have distance $\sqrt{14}$ from the plane.

3 (8 points) Consider the curve with parametric equations

$$\begin{cases} x = t^2 + 2t \\ y = t^3 + 2t^2 - 3t \end{cases}$$

defined on the interval $-3 \leq t \leq -1$. Set up an integral that computes the surface area of the the solid generated by rotating the curve about the x-axis. SET UP ONLY. DO NOT EVALUATE.



4 (8 points) A particle starts at the origin with initial velocity $2\mathbf{i} + \mathbf{j} - 3\mathbf{k}$. Its acceleration is $\mathbf{a}(t) = 12t^2\mathbf{i} + 6t\mathbf{j} - 9t\mathbf{k}$. Find its position at time t.

5 (12 points) Let $\mathbf{r}(t) = \langle\, 3\cos t, 5\sin t, 4\cos t \,\rangle$. Compute the binormal vector $\mathbf{B}$ at $t = 0$.