Math 20C.
Midterm Exam 1
April 19, 2004

You may use one page of notes and a calculator, but no other assistance on this exam.
Read each question carefully, answer each question completely, and show all of your work.
Write your solutions clearly and legibly; no credit will be given for illegible solutions.
If any question is not clear, ask for clarification.

1. Consider the two planes given by $4x - 8y + z = 2$ and $2x + y + 2z = 1$.

   (a) (2 points) Find the cosine of the angle between the two planes.

   (b) (4 points) Find parametric equations for the line of intersection of the two planes.

#	Score
1	
2	
3	
Σ	

2. Consider the two lines

$$\mathbf{r} = (4 - t)\mathbf{i} + (-1 + t)\mathbf{j} + 2t\mathbf{k}$$
$$\mathbf{r} = (3 - s)\mathbf{i} + s\mathbf{j} + 2\mathbf{k}$$

(a) (2 points) Find the point at which the lines intersect.

(b) (4 points) Find an equation for the line through the point of intersection of the lines and perpendicular to both lines.

(c) (4 points) Find an equation for the plane that contains both lines.

3. Let $\mathbf{r}(u) = \langle e^{-u}, e^u, \sqrt{2}u \rangle$

   (a) (2 points) What is the domain of $\mathbf{r}(u)$?

   (b) (4 points) Find the equation of the tangent line to $\mathbf{r}(u)$ at $u = 0$.

   (c) (4 points) Compute $\mathbf{T}(0)$, the unit tangent vector $\mathbf{T}(u)$ to $\mathbf{r}(u)$ at $u = 0$.

3. (d) (4 points) Compute the arclength of $\mathbf{r}(u)$ over $0 \le u \le 1$.