Math 210 Midterm I February 12, 1993

Name _____ SS number _____

CIRCLE YOUR ANSWER
SHOW ALL WORK

1) (10pt) Find the cosine of the angle between the vectors $\langle 1, 2, -3 \rangle$ and $\langle -1, 0, 2 \rangle$.

2) (10pt) Find the projection of $2\vec{\mathbf{i}} - 3\vec{\mathbf{j}} + \vec{\mathbf{k}}$ onto $\vec{\mathbf{i}} + 6\vec{\mathbf{j}} - 2\vec{\mathbf{k}}$.

3) (10 pt) Find parametric equations for the line through the points (2,-7,5) and (-4,2,5).

4) (10pt) Find the equation of the plane passing through the points (-1,1,1), (1,-1,2) and (4,0,3).

5) (12 pt) Find parametric equations for the line of intersection of the planes $x+3y-z=1$ and $x-y+z=2$.

6) (12 pt) A particle moves through space with acceleration $\vec{\mathbf{a}}(t) = \langle 2, \sin t, \cos t \rangle$, initial velocity $\vec{\mathbf{v}}(0) = \langle 0, 0, 0 \rangle$ and initial position $\vec{\mathbf{r}}(0) = \langle 0, 0, 0 \rangle$. Find the position vector $\vec{\mathbf{r}}(t)$.

7) (12 pt) Let $\vec{\mathbf{r}}(t) = \langle \sin \pi t, \sqrt{t}, \cos \pi t \rangle$. Find parametric equations for the line tangent to the curve parameterized by $\vec{\mathbf{r}}$ at the point (0,1,-1).

8) (12 pt) Let $\vec{\mathbf{r}}(t) = \langle t, e^t, 1\rangle$. For $t = 0$ find the unit tangent vector $\mathbf{T}(t)$ and the unit normal vector $\mathbf{N}(t)$.

9) (12 pt) Let $\vec{\mathbf{r}}(t) = \langle t^3, t^2, t\rangle$. Find the curvature $\kappa(t)$.