MA 126 Test 1 NAME____________________________
100 points Spring, 2010

PART 1. Part 1 consists of 6 questions. Show your work and clearly mark your final answer in the space provided. (5 points each)

1. Given the vector $\vec{a} = <5, -3, 2>$, find a unit vector in the direction of $\vec{a}$.

2. Find the equation of the line through the points $P(-2, 0, 1)$ and $Q(2, 1, 2)$.

3. Find a vector perpendicular to both of the vectors $\vec{a} = <1, 0, 1>$ and $\vec{b} = <0, -1, 2>$.

4. Let $\vec{a} = <1,-1,3>$ and $\vec{b} = <0,-1,2>$. Find the scalar projection $comp_{\vec{b}}(\vec{a})$ and vector projection $proj_{\vec{b}}(\vec{a})$ of $\vec{a}$ onto $\vec{b}$.

5. Find the angle between the vectors $\vec{a} = <1,-2,2>$ and $\vec{b} = <-1,2,3>$. (You may leave your answer in the form $\theta = \cos^{-1}(x)$.)

6. Find the equation of the plane through the point $(-1,2,3)$ which is perpendicular to the line

$$L = \begin{cases} x = -2 + 2t \\ y = 3 + 7t \\ z = -1 - t \end{cases}.$$

<u>Part 2.</u> **Part 2 consists of 6 problems worth 10 points apiece. Show all your work for full credit! Displaying only the final answer (even if correct) without the relevant steps is not enough.**

1. Find the intersection of the line $L = \begin{cases} x = -2 + 2t \\ y = 3 + 7t \\ z = -1 - t \end{cases}$ with the plane $2x - y + z = -6$.

2. Find the area of the triangle with vertices $P(1,1,1)$, $Q(2,1,-2)$, and $R(0,3,2)$.

3 Find the parametric equations for the tangent line to the helix given below at the point P where where $t = \pi/2$.

$$x = 2\cos(t),\ \ y = \sin(t),\ \ z = t$$

4. Find a vector equation or parametric equations for the line of intersection of the planes $2x + y + z = 1$ and $x + 2y = 7$.

5. Find the distance from the point $(-1,2,3)$ and the plane $2x-y+z=5$.

6. Given the two lines $L_1 = \begin{cases} x = t \\ y = 2-t \\ z = 1+t \end{cases}$ and $L_2 = \begin{cases} x = 2+2s \\ y = 3+s \\ z = 6+5s \end{cases}$. determine if they are parallel, skew, or intersect. If they are parallel, determine if they are identical lines. If they intersect, determine the point of intersection. If they are skew, find the distance between the lines.