MATH 2210-90 Fall 2011
First Midterm Exam

INSTRUCTOR: H.-PING HUANG

LAST NAME _____

FIRST NAME _____

ID NO. _____

INSTRUCTION: SHOW ALL OF YOUR WORK. MAKE SURE YOUR ANSWERS ARE CLEAR AND LEGIBLE. USE **SPECIFIED** METHOD TO SOLVE THE QUESTION. IT IS NOT NECESSARY TO SIMPLIFY YOUR FINAL ANSWERS.

PROBLEM 1 20 _____

PROBLEM 2 20 _____

PROBLEM 3 20 _____

PROBLEM 4 20 _____

PROBLEM 5 20 _____

TOTAL 100 _____

PROBLEM 1

(20 pt) Let T be the triangle with vertices at $P = (-8, -9)$, $Q = (-7, 10)$, $R = (-7, 1)$, find the area of T.

Hint: Let u be the vector from R to P and v, from R to P. Find $\|\vec{u} \times \vec{v}\|$. Do not calculate the numerical value.

PROBLEM 2

(20 pt) What is the distance from $(0, 3, 7)$ to the xz-plane?

Hint: What is the normal vector of xz-plane?

PROBLEM 3

(20 pt) Consider the vector functions

$$X(t) = 8\hat{\mathbf{i}} + \cos(7t)\hat{\mathbf{j}}, \quad Y(t) = \sin(7t)\hat{\mathbf{j}} + 3\hat{\mathbf{k}}, \quad Z(t) = X(t) \times Y(t).$$

Find $dZ(t)/dt$.

Notation: $\hat{\mathbf{i}} = (1, 0, 0)$, $\hat{\mathbf{j}} = (0, 1, 0)$, $\hat{\mathbf{k}} = (0, 0, 1)$

PROBLEM 4

(20 pt) Given that the acceleration vector is $-9\cos(-3t)\hat{\mathbf{i}}+9\sin(3t)\hat{\mathbf{j}}+3t\hat{\mathbf{k}}$, the initial velocity is $(1,0,1)$, and the initial position vector is $(1,1,1)$.

Find the formula of the velocity vector and the position vector.

PROBLEM 5

(20 pt) Let P be the point $(10, -4, 2)$ in cartesian coordinates. Find the cylindrical coordinates and the spherical coordinates.

Remark: Do not calculate the numerical values.