Math 241, Fall 1999, exam 1

PRINT Your Name:_____

There are 10 problems on 4 pages. Each problem is worth 10 points. SHOW your work. $\boxed{CIRCLE}$ your answer.

NO CALCULATORS!

1. Describe the graph of $xyz = 0$ in $3-$ space.

2. Describe the graph of $x^2 = y^2$ in $3-$ space.

3. Find the work done by the force $\vec{F} = 2\vec{i} - 5\vec{j}$ pounds in moving an object from $(2, 1)$ to $(5, 9)$, distance is measured in feet.

4. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equation of the plane through $(1, 1, 1)$, $(2, 2, 3)$, and $(3, 5, 6)$.

5. Let $\vec{a} = 2\vec{i} + 3\vec{j}$ and $\vec{b} = 8\vec{i} - 2\vec{j} + 3\vec{k}$. Compute $\vec{a} \times \vec{b}$.

6. Let $\vec{a} = 3\vec{i} + 2\vec{j}$ and $\vec{b} = 2\vec{i} - 2\vec{j} + 3\vec{k}$. Find the angle between $\vec{a}$ and $\vec{b}$.

7. Find the vector of length 3 which has the same direction as $\vec{b} = 3\vec{i} - 2\vec{j} + 3\vec{k}$.

8. **(There is no partial credit for this problem. Make sure your answer is correct.)** Let $\vec{a} = -2\vec{i} + 4\vec{j}$ and $\vec{b} = 2\vec{i} - 2\vec{j} + 3\vec{k}$. Find vectors $\vec{u}$ and $\vec{v}$ with $\vec{b} = \vec{u} + \vec{v}$, $\vec{u}$ parallel to $\vec{a}$, and $\vec{v}$ perpendicular to $\vec{a}$.

9. Find the distance between $3x + 1y + 3z = 6$ and $3x + 1y + 3z = 10$.

10. Find the point on $(x - 1)^2 + (y - 2)^2 + (z - 3)^2 = 9$ which is closest to $2x + 3y + 4z = 1000$.