

Math 241, Fall 2000, Exam 1

PRINT Your Name: _____

There are 10 problems on 4 pages. Each problem is worth 10 points. SHOW your work. **CIRCLE** your answer. **NO CALCULATORS!**

1. Graph and describe the graph of $xz = 0$ in 3-space.
2. Graph and describe the graph of $x^2 + y^2 = 4$ in 3-space.
3. Find the angle between $\vec{u} = 2\vec{i} + 3\vec{j} - \vec{k}$ and $\vec{v} = 3\vec{i} + 2\vec{j} + \vec{k}$.
4. What is the distance from the point $(1, 2, 3)$ to the z -axis.
5. Find the center and radius of the sphere $x^2 + y^2 + z^2 + 2x - 6y - 10z + 34 = 0$.
6. If $\vec{u} = \vec{i} + 2\vec{j} + 3\vec{k}$ and $\vec{v} = 5\vec{i} + y\vec{j} - 3\vec{k}$ are perpendicular, then find y .
7. **(There is no partial credit for this problem. Make sure your answer is correct.)** Let $\vec{a} = \vec{i} + 3\vec{j} + 4\vec{k}$ and $\vec{b} = 3\vec{i} + 7\vec{j} + 7\vec{k}$. 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} .
8. Find the distance between $x + 2y + 3z = 1$ and $x + 2y + 3z = 2$.
9. Find the equation of the plane which contains the point $(1, 2, 3)$ and is parallel to the plane $2x - 3y + 4z = 2$.
10. Find the point on $(x - 1)^2 + (y - 2)^2 + (z - 3)^2 = 6$ which is closest to $x + y + 2z = 20$.