

Math 241, Spring 1998, 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!** Check your answer whenever possible!

1. Graph $x^2 + y^2 = 1$ in 3– space.
2. Graph $x^2 + y^2 + z^2 = 1$ in 3– space.
3. Graph $x^2 = 1$ in 3– space.
4. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equation of the plane through $(1, 2, 1)$, $(2, 0, 2)$, and $(2, 3, 0)$.
5. Let $\vec{a} = 2\vec{i} + 3\vec{j} + \vec{k}$ and $\vec{b} = 2\vec{i} - \vec{j} + 4\vec{k}$. Find the angle between \vec{a} and \vec{b} .
6. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equations of the line which contains $(1, 2, 3)$ and $(-4, 2, 0)$.
7. **(There is no partial credit for this problem. Make sure your answer is correct.)** Let $\vec{a} = 2\vec{i} + 3\vec{j} + \vec{k}$ and $\vec{b} = 2\vec{i} - \vec{j} + 4\vec{k}$. 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 a point which is the distance 2 from $x + 2y + 2z = 1$.
9. Find the point on $2x + y + 2z = 1$ which is closest to $(2, 3, 3)$.
10. The intersection of $x^2 + y^2 + z^2 \leq 9$ and $x^2 + y^2 + (z - 5)^2 \leq 9$ is a solid in 3– space. Find the volume of this solid.