

Math 241, Spring 2001, Exam 2

PRINT Your Name: _____

There are 8 problems on 4 pages. Problems 1–4 are worth 13 points each. Each of the other problems is worth 12 points. SHOW your work. CIRCLE your answer. **NO CALCULATORS!**

1. Graph and describe the graph of $x^2 + y^2 + z^2 = 1$ in 3–space.
2. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equations of the line through $(1, 4, 7)$ and $(2, 5, 11)$.
3. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equation of the plane through $(1, 1, 2)$, $(3, 1, 1)$, and $(2, 2, 2)$.
4. Find the equations of the line which contains $(2, 5, 4)$ and is perpendicular to $3x + 7y + 4z = 8$.
5. What are the equations of the line tangent to the curve parameterized by $\vec{r}(t) = 3t^3 \vec{i} + 2t^2 \vec{j} + 4t^5 \vec{k}$ at $t = -1$?
6. **(There is no partial credit for this problem. Make sure your answer is correct.)** Let $\vec{a} = -\vec{i} + 2\vec{j} + 3\vec{k}$ and $\vec{b} = -3\vec{i} + 5\vec{j} + 5\vec{k}$. 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} .
7. Find the equation of the plane which contains the point $(2, 1, 3)$ and the line

$$\begin{cases} x = 1 + t \\ y = -1 + 8t \\ z = 3 - 2t. \end{cases}$$

CHECK YOUR ANSWER!

8. Find the length of the curve parameterized by $\vec{r}(t) = \cos t \vec{i} + \sin t \vec{j} + t^{\frac{3}{2}} \vec{k}$, for $0 \leq t \leq \frac{20}{3}$.