Math 241, Fall 1999, exam 2

PRINT Your Name:______________________________

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. $\boxed{CIRCLE}$ your answer.

NO CALCULATORS!

1. Graph $x^2 - y^2 = 1$ in $2-$ space.

2. Graph $x^2 - y^2 = 1$ in $3-$ space.

3. Graph and name $x^2 + y^2 = z$ 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 $(1, 2, 2)$, $(1, 4, 5)$, and $(5, 5, 4)$.

5. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equations of the line through $(5, 2, 4)$ and $(2, 4, 7)$.

6. Do the following lines intersect? If so, find their point of intersection.

$$\frac{x+1}{-1} = \frac{y-10}{3} = \frac{z-10}{2} \quad \text{and} \quad \frac{x-4}{1} = \frac{y-5}{2} = \frac{z+8}{-6}$$

7. Find the length of the curve $\overrightarrow{\boldsymbol{r}}(t) = \sqrt{6}t^2\,\overrightarrow{\boldsymbol{i}} + \frac{2}{3}t^3\,\overrightarrow{\boldsymbol{j}} + 6t\,\overrightarrow{\boldsymbol{k}}$ for $2 \le t \le 6$.

8. What are the equations of the line tangent to the curve $\overrightarrow{\boldsymbol{r}}(t) = (3t^2 + 2)\,\overrightarrow{\boldsymbol{i}} + 4t\,\overrightarrow{\boldsymbol{j}} + (4t^2 + 2t)\,\overrightarrow{\boldsymbol{k}}$ at $t = 1$?

9. Find the equations of **any** line which is contained on the plane $2x + 3y + z = 6$.

10. Find the equation of **any** plane which contains the line

$$\begin{cases} x = 2 + 3t \\ y = 4 - 2t \\ z = 5 - 4t. \end{cases}$$