

Math 241, Fall 1997, exam 2

PRINT Your Name: _____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. CIRCLE your answer.

NO CALCULATORS!

1. Describe the graph of $yz = 0$ in 3-space.
2. Graph $x^2 - y^2 = 1$ in 2-space.
3. Graph $\frac{x^2}{9} + \frac{y^2}{16} + \frac{z^2}{25} = 1$ 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 $(1, 2, 1)$, $(1, 4, 3)$, 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 $(-1, 2, 4)$ and $(2, -3, 6)$.
6. Do the following lines intersect? If so, find their point of intersection.

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

7. Find the length of the curve
 $\vec{r}(t) = \sqrt{6}t^2 \vec{i} + \frac{2}{3}t^3 \vec{j} + 6t \vec{k}$ for $3 \leq t \leq 6$.
8. What are the equations of the line tangent to the curve
 $\vec{r}(t) = (3t^2 + 1) \vec{i} + 6t \vec{j} + (4t^3 + 2t) \vec{k}$ at $t = 1$?
9. Find the equations of **any** line which is contained on the plane $x + 2y + 3z = 6$.
10. Find the equations of **any** plane which contains the line

$$\begin{cases} x = 1 + 2t \\ y = 3 - t \\ z = 4 - 3t. \end{cases}$$