

MATH 241, FALL 2001, EXAM 2

PRINT Your Name: _____

Please write your name on the back of your exam also. You may pick up your exam before our next class. The graded exam will be available outside my office all day on Wednesday, October 3.

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. CIRCLE your answer. **NO CALCULATORS!**

1. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equation of the plane through $(1, 7, 1)$, $(4, 1, 1)$, and $(1, 1, 3)$.
2. **(There is no partial credit for this problem. Make sure your answer is correct.)** Find the equations of the line through $(4, 7, 9)$ and $(2, 4, 6)$.
3. Find the equations of the line which contains $(1, 2, 4)$ and is perpendicular to $2x + 9y + 4z = 8$.
4. Find the equation of the plane which contains $(3, 2, 1)$ and is perpendicular to $\frac{x-3}{5} = \frac{y-2}{3} = \frac{z-6}{7}$.
5. Find the point of intersection of the following lines. **CHECK YOUR ANSWER!**

$$x + 2 = y + 6 = z + 3 \quad \text{and} \quad \frac{x-7}{1} = \frac{y-7}{2} = \frac{z-14}{3}$$

6. Find the equations of **any** line which is contained on the plane $2x + 3y + 3z = 12$.
7. **(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 $\vec{b} = 3\vec{i} + 7\vec{j} + 13\vec{k}$. 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 point on $2x - y - 3z = 19$ which is closest to $(1, 2, 3)$.
9. Graph and describe the graph of $yz = 0$ in 3-space.
10. Consider the triangle with vertices $P = (1, 2, 3)$, $Q = (0, 1, 2)$, and $R = (2, 4, 7)$. Find the angle of this triangle at the vertex Q .