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!

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

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 \(Q\).