1. (There is no partial credit for this problem. Make sure your answer is correct.) Find the equation of the plane through \((1,1,1)\), \((1,2,-2)\), and \((3,1,-3)\).

\[
\mathbf{P}_1 \times \mathbf{P}_2 = \begin{vmatrix}
\mathbf{i} & \mathbf{j} & \mathbf{k} \\
1 & 2 & -1 \\
0 & 1 & -3 \\
2 & 0 & -4
\end{vmatrix}
\]

\[
= \mathbf{i}(-8+3) - \mathbf{j}(4-0) + \mathbf{k}(0+2) = -5\mathbf{i} - 4\mathbf{j} + 2\mathbf{k}
\]

\[-5(x-1) - 4(y-1) + 2(z+1) = 0
\]

\[
2(x-1) + 3(y-1) + 1(z+3) = 0
\]

\[2x + 3y + z = 6
\]

Check:
- \(2+3+3=6\)
- \(2+6-2=6\)
- \(6+3-3=6\)

2. (There is no partial credit for this problem. Make sure your answer is correct.) Find the equations of the line through \((1,3,4)\) and \((3,6,9)\).

\[
\mathbf{P}_0 = 2\mathbf{i} + 3\mathbf{j} + 5\mathbf{k}
\]

\[
\begin{cases}
x = 1 + 2t \\
y = 3 + 3t \\
z = 4 + 5t
\end{cases}
\]