3. Find the equation of the plane tangent to \( x^2 + y^2 + 2z^2 = 7 \) at \((1, 2, 1)\).

\[
\begin{align*}
\text{Gradients are } & \perp \text{ to level sets} \\
\n\begin{vmatrix}
\frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\
2x & 2y & 4z \\
\end{vmatrix}
& = \begin{vmatrix}
\frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\
1 & 2 & 2 \\
\end{vmatrix} \\
& = 2 + 4z - 2y \\
& = 0 \\
\end{align*}
\]

\[
\begin{align*}
2(1) + 4(2) + 4(1) &= 0 \\
\end{align*}
\]

4. Find the equations of the line perpendicular to \( x^2 + y^2 + 2z^2 = 7 \) at \((1, 2, 1)\).

We want the line through \((1, 2, 1)\) which is \( \perp \) to \( 2x + 4y + 4z \).

(The numbers here not changed since Problem 3.)

\[
\begin{align*}
x &= 2t + 1 \\
y &= 4t + 2 \\
z &= 4t + 1 \\
\end{align*}
\]