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

P= Q= R=

$\vec{PQ} = 2\vec{i} - \vec{k}$

$\vec{PR} = \vec{i} + \vec{j}$

$\vec{PQ} \times \vec{PR} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 2 & 0 & -1 \\ 1 & 1 & 0 \end{vmatrix} = \vec{i} - \vec{j} + 2\vec{k}$

The plane is $(x-1) - (y-1) + 2(z-2) = 0$

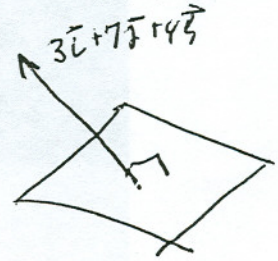
$x - y + 2z = 4$

P is on the plane $1 - 1 + 4 = 4$ ✓

Q $3 - 1 + 2 = 4$ ✓

R $2 - 2 + 4 = 4$ ✓

4. Find the equations of the line which contains $(2,5,4)$ and is perpendicular to $3x + 7y + 4z = 8$.



$\frac{x-2}{3} = \frac{y-5}{7} = \frac{z-4}{4}$