Please PRINT your name _____

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work **correct**, **complete** and **coherent**.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 6, September 18, 2019

Find the equation of the plane which contains $P_1 = (1, 1, -1)$, $P_2 = (2, 0, 2)$, and $P_3 = (0, -2, 1)$.

ANSWER: The vector $\overrightarrow{P_1P_2} \times \overrightarrow{P_1P_3}$ is perpendicular to the desired plane. We compute

$$\overrightarrow{P_1P_2} \times \overrightarrow{P_1P_3} = \begin{vmatrix} \overrightarrow{i} & \overrightarrow{j} & \overrightarrow{k} \\ 1 & -1 & 3 \\ -1 & -3 & 2 \end{vmatrix} = \overrightarrow{i} \begin{vmatrix} -1 & 3 \\ -3 & 2 \end{vmatrix} - \overrightarrow{j} \begin{vmatrix} 1 & 3 \\ -1 & 2 \end{vmatrix} + \overrightarrow{k} \begin{vmatrix} 1 & -1 \\ -1 & -3 \end{vmatrix} = 7\overrightarrow{i} - 5\overrightarrow{j} - 4\overrightarrow{k}.$$

The plane through $(1, 1, -1)$ perpendicular to $7\overrightarrow{i} - 5\overrightarrow{j} - 4\overrightarrow{k}$ is

$$7(x-1) - 5(y-1) - 4(z+1) = 0,$$

which is the same as

$$\boxed{7x - 5y - 4z = 6}.$$

Check: The point $(1, 1, -1)$ satisfies the proposed equation because $7 - 5 + 4 = 6$. The point $(2, 0, 2)$ satisfies the proposed equation because $14 - 8 = 6$. The point $(0, -2, 1)$ satisfies the proposed equation because $10 - 4 = 6$.