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

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

Please take a picture of your quiz (for your records) just before you turn the quiz in. I will e-mail your grade and my comments to you. I will keep your quiz.

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

Quiz 2, September 1, 2022

Find the equation of the plane in 3-space which contains the points $(1,1,-1)$, $(2,0,2)$, and $(0,-2,1)$. Please make sure that all three points satisfy your equation.

Answer: Let $P = (1,1,-1)$, $Q = (2,0,2)$, and $R = (0,-2,1)$. Observe that

$$\overrightarrow{PQ} = \overrightarrow{i} - \overrightarrow{j} + 3\overrightarrow{k} \quad \text{and} \quad \overrightarrow{PR} = -\overrightarrow{i} - 3\overrightarrow{j} + 2\overrightarrow{k}.$$

We compute

$$\overrightarrow{PQ} \times \overrightarrow{PR} = \begin{vmatrix} \overrightarrow{i} & \overrightarrow{j} & \overrightarrow{k} \\ 1 & -1 & 3 \\ -1 & -3 & 2 \end{vmatrix} = \begin{vmatrix} -1 & 3 \\ -3 & 2 \end{vmatrix} \overrightarrow{i} - \begin{vmatrix} 1 & 3 \\ -1 & 2 \end{vmatrix} \overrightarrow{j} + \begin{vmatrix} 1 & -1 \\ -1 & -3 \end{vmatrix} \overrightarrow{k}$$

$$= 7\overrightarrow{i} - 5\overrightarrow{j} - 4\overrightarrow{k}.$$

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

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

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

Check The point $P = (1,1,-1)$ satisfies the proposed answer because $7 - 5 + 4 = 6$. ✓
  The point $Q = (2,0,2)$ satisfies the proposed answer because $14 - 8 = 6$. ✓
  The point $R = (0,-2,1)$ satisfies the proposed answer because $10 - 4 = 6$. ✓