

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 3, February 1, 2021

Find a (non-zero) vector that is perpendicular to the plane which contains the points $P = (1, -1, 2)$, $Q = (2, 0, -1)$, and $R = (0, 2, 1)$.

ANSWER: The vector $\vec{PQ} \times \vec{PR}$ is perpendicular to plane which contains the points

$$P = (1, -1, 2), \quad Q = (2, 0, -1), \quad \text{and} \quad R = (0, 2, 1).$$

We know

$$\vec{PQ} = \vec{i} + \vec{j} - 3\vec{k} \quad \text{and} \quad \vec{PR} = -\vec{i} + 3\vec{j} - 1\vec{k}.$$

We compute

$$\begin{aligned} \vec{PQ} \times \vec{PR} &= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 1 & -3 \\ -1 & 3 & -1 \end{vmatrix} = \begin{vmatrix} 1 & -3 \\ 3 & -1 \end{vmatrix} \vec{i} - \begin{vmatrix} 1 & -3 \\ -1 & -1 \end{vmatrix} \vec{j} + \begin{vmatrix} 1 & 1 \\ -1 & 3 \end{vmatrix} \vec{k} \\ &= (-1+9)\vec{i} - (-1-3)\vec{j} + (3+1)\vec{k} = \boxed{8\vec{i} + 4\vec{j} + 4\vec{k}}. \end{aligned}$$