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MAC 2313.9256
Cyr

Quiz 2
You must show all work to receive full credit!!

Problem 1. (8 pts) Find the scalar form of the equation of the plane passing through the points $P = (0, 2, 0)$, $Q = (4, 1, 1)$, and $R = (1, 0, 3)$.

① Find two vectors in the plane:

$$\overrightarrow{PQ} = \langle 4, -1, 1 \rangle, \quad \overrightarrow{PR} = \langle 1, -2, 3 \rangle$$

② Find a normal vector to the plane by taking cross product of vectors from ①:

$$\vec{n} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & -1 & 1 \\ 1 & -2 & 3 \end{vmatrix} = \langle -3 + (+2), -(12-1), -8+(+1) \rangle = \langle -1, -11, -7 \rangle$$

Any multiple is a normal vector, so take $\vec{n} = \langle 1, 11, 7 \rangle$

③ Find plane equation: $\vec{n} \cdot \langle x, y, z \rangle = \vec{n} \cdot \langle x_0, y_0, z_0 \rangle$

$$\Rightarrow \langle 1, 11, 7 \rangle \cdot \langle x, y, z \rangle = \langle 1, 11, 7 \rangle \cdot \langle 0, 2, 0 \rangle$$

$$\Rightarrow \boxed{x + 11y + 7z = 22}$$

Problem 2. (2 pts) Find the equation of the plane parallel to the x, z-plane which contains the point $(-1, 4, 3)$.

Normal vector is parallel to normal vector for x, z-plane

$\Rightarrow$ take $\vec{n} = \langle 0, 1, 0 \rangle$. Then

$$\vec{n} \cdot \langle x, y, z \rangle = \vec{n} \cdot \langle -1, 4, 3 \rangle$$

$$\Rightarrow \boxed{y = 4}$$