

12.5, number 21: Find the equation of the plane through the point $P_0 = (0, 2, -1)$ perpendicular to $\vec{N} = 3\vec{i} - 2\vec{j} - \vec{k}$.

Answer: The point $P = (x, y, z)$ is on the plane precisely when the vector from P_0 to P is perpendicular to \vec{N} . That is, P is on the plane precisely when

$$\overrightarrow{P_0P} \cdot \vec{N} = 0$$

$$((x - 0)\vec{i} + (y - 2)\vec{j} + (z + 1)\vec{k}) \cdot (3\vec{i} - 2\vec{j} - \vec{k}) = 0.$$

$$3x - 2(y - 2) - (z + 1) = 0$$

$$\boxed{3x - 2y - z = -3.}$$