

**Answer on Question #83677 – Math – Analytic Geometry**

**Question**

Find the equation of the plane through (2,3,-4) and (1,-1,3) and parallel to x-axis?

**Solution**

Assume that  $Ax + By + Cz + D = 0$  is an equation of the plane.

The plane is parallel to x- axis, hence

$$A = 0 \quad (1)$$

The points (2,3,-4), (1,-1,3) lie on the plane, hence

$$\begin{cases} 3B - 4C + D = 0, \\ -B + 3C + D = 0. \end{cases}$$

$$\begin{cases} D = 4C - 3B, \\ D = B - 3C. \end{cases}$$

$$4C - 3B = B - 3C,$$

$$-4B = -7C,$$

$$C = \frac{4}{7}B, \quad (2)$$

$$D = 4C - 3B = 4 * \frac{4}{7}B - 3B = \frac{16}{7}B - 3B = \frac{16-21}{7}B = -\frac{5}{7}B,$$

$$D = -\frac{5}{7}B, \quad (3)$$

$$By + cz + d = 0,$$

$$By + \frac{4}{7}Bz - \frac{5}{7}B = 0, \quad (4)$$

If

$$B = 0, \quad (5)$$

then it follows from (2), (3), (5) that

$$C = 0, D = 0 \quad (6)$$

In case of (5) taking (1), (5), (6) into account one gets that all coefficients in the equation

$$Ax + By + Cz + D = 0$$

are zero, which is impossible, therefore

$$B \neq 0 \quad (7)$$

Using (7) divide the equation (4) through by  $B \neq 0$ .

Then

$$7y + 4z - 5 = 0$$

is the equation of the plane through (2,3,-4), (1,-1,3) and parallel to x- axis.

**Answer:**  $7y + 4z - 5 = 0$ .