

Math215

Homework 4, Problem 3

November 23, 2021

10.5 Pr31

Find an equation of the plane that passes through the point (1,5,1) and is perpendicular to the planes $2x + y - 2z = 2$ and $x + 3z = 4$

Finding vector normal to the plane

$$\langle a_1, a_2, a_3 \rangle \times \langle b_1, b_2, b_3 \rangle = \langle a_2b_3 - a_3b_2, a_3b_1 - a_1b_3, a_1b_2 - a_2b_1 \rangle \quad (1)$$

$$\langle 2, 1, -2 \rangle \times \langle 1, 0, 3 \rangle = \langle (1)(3) - (-2)(0), (-2)(1) - (2)(3), (2)(0) - (1)(1) \rangle = \langle 3, -8, -1 \rangle$$

Finding normal vector through the point

$$a(x - x_0) + b(y - y_0) + c(z - z_0) = 0 \quad (2)$$

$$3(x - 1) - 8(y - 5) - (z - 1) = 0$$

$$3x - 3 - 8y + 40 - z + 1 = 0$$

$$3x - 8y - z = -38$$