**8.5 – The Cartesian Equation of a Plane**



Suppose you know a point on the plane, then [x-x0,y-y0, z-z0] is a vector on the plane. Since the normal is perpendicular to the plane, [x-x0,y-y0, z-z0] • [a,b,c] = 0. We use this fact to come up with the Cartesian Equation of the plane.

**Example:** A plane contains point (2,4,-1) and has normal [3,1,-4]. Determine the equation of the plane.

Notice: It is easy to find a normal to a plane! Use the cross product since the cross product yields a vector perpendicular to two vectors.



**Example:** Determine the Cartesian equation of the plane that has points A(-3,2,1), B(4,2,1) and C(-1,-4,5)

**Example:** Determine the Cartesian form of a plane whose vector form is

**Example:** Determine the vector and parametric equations of the plane with Cartesian equation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is true about the normals for two planes that are parallel?

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What is true about the normal of two planes that are perpendicular?



How can you find the angle between two intersecting planes?



**Example:** Show that the two planes are perpendicular.

π1: 3x – 2y +4z +3 = 0 and π2: 10x +5y – 5z +8 = 0

**Example:** Show that the two planes are parallel.

π1: 3x – 2y +4z +3 = 0 and π2: 15x -10y +20z +8 = 0

**Example:** Determine the angle between the two planes.

π1: 5x – 2y +2z +3 = 0 and π2: x +5y – 2z +8 =

**Homework: pg468 #1-14**