**PDF 8.050 Cartesian Equation of a Plane (aka Scalar Equation of a Plane)**

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| The Cartesian (or scalar) equation of a plane in $R^3$ is of the form Ax + By + Cz + D = 0.<br>The vector $\overrightarrow{(A,B,C)}$ is a normal vector (perpendicular to all of the vectors in the plane) |

* This is derived in your powerpoint

Example 1

Express the plane $\vec{r} = \overrightarrow{(-5,-1,10)} + s\overrightarrow{(3,-4,6)} + t\overrightarrow{(1,7,4)}$ in Cartesian equation form.

Example 2

Determine the Cartesian equation of the plane that contains the points A(5,2,3), B(-1,3,-9) and C(7,8,2)

Angle Between Two Planes

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| The angle between two planes is equal to the angle between the normal vectors of the two planes |

Example 3

Show that the two planes $\pi_1: 2x + 3y - 4z + 19 = 0$ and $\pi_2: 5x + 2y + 4z - 9 = 0$ are perpendicular

Example 4

Show that the planes $\pi_1: 3x - 9y + 3z - 5 = 0$ and $\pi_2: 2x - 6y + 2z - 4 = 0$ are parallel but not coincident.

Example 5

Determine the acute and the obtuse angle of intersection of the planes

$\pi_1: 4x - 8y - 3z + 64 = 0$ and $\pi_2: x - 5y + 15z - 11 = 0$

Example 6

State the equation of the plane 6x + 3y – z + 12 = 0 in vector equation form and in parametric equation form.