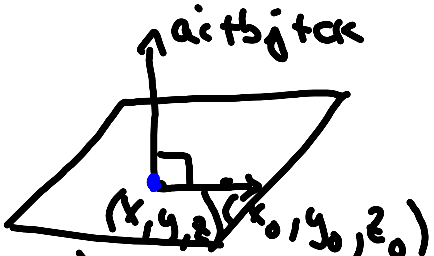
Equations of Planes

Given $\boxed{a(x-x_0)+b(y-y_0)+c(z-z_0)}$

$\Rightarrow$ (x_0, y_0, z_0) is a point in the plane.

$ai+bj+ck$ = normal vector (obtained by cross product)



$\Rightarrow (x-x_0)i+(y-y_0)j+(z-z_0)k$

Find an equation of the plane containing A, B, and C

(1.) $A(0,0,4)$, $B(1,2,4)$, $C(-2,4,3)$

$v_1 = \overrightarrow{AB} = \langle 1,2,0 \rangle$
$v_2 = \overrightarrow{AC} = \langle -2,4,-1 \rangle$
} same initial starting place

$$v_1 \times v_2 = \begin{array}{ccc} + & - & + \\ \end{array}\begin{vmatrix} i & j & k \\ 1 & 2 & 0 \\ -2 & 4 & -1 \end{vmatrix} = i(-2-0) - j(-1-0) + k(4+4)$$
$$= -2i + j + 8k \text{ (normal vector)}$$

$P_0 = \langle 0,0,4 \rangle$ starting place

$n_\perp = \langle -2,1,8 \rangle$ (normal vector)

$$\Rightarrow a(x-x_0) + b(y-y_0) + c(z-z_0) = 0$$
$$-2(x-0) + 1(y-0) + 8(z-4) = 0$$
$$-2x + y + 8z - 32 = 0$$
$$\boxed{-2x + y + 8z = 32}$$