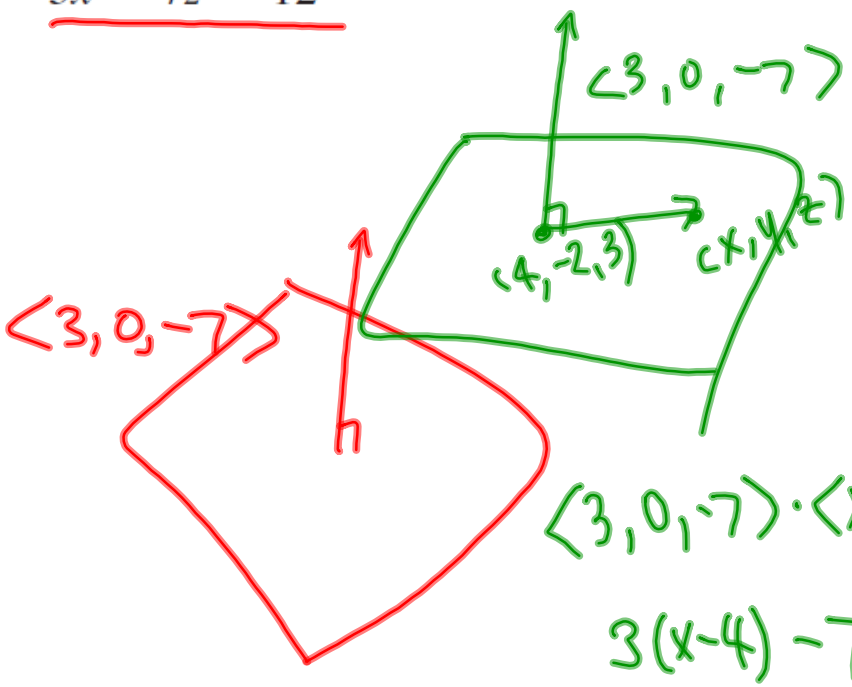
29. The plane through the point $(4, -2, 3)$ and parallel to the plane $3x - 7z = 12$



$\langle 3, 0, -7 \rangle \cdot \langle x-4, y+2, z-3 \rangle = 0$

$3(x-4) - 7(z-3) = 0$

27. The plane through the origin and parallel to the plane
$2x - y + 3z = 1$

$P(0,0,0)$

$\vec{V}\langle x-0, y-0, z-0\rangle = \langle x,y,z\rangle$

$\vec{N}\langle 2,-1,3\rangle$

$\vec{N}\cdot\vec{V} = 0$

$2(x) - y + 3z = 0$

A B C

31. The plane through the points (0, 1, 1), (1, 0, 1), and (1, 1, 0)

$\overrightarrow{AB} = \langle 1, -1, 0 \rangle \quad \overrightarrow{AC} = \langle 1, 0, -1 \rangle$

$\overrightarrow{AB} \times \overrightarrow{AC} = \langle 1-0, 0+1, 0+1 \rangle$

$= \langle 1, 1, 1 \rangle \cdot \langle x-1, y, z-1 \rangle = 0$

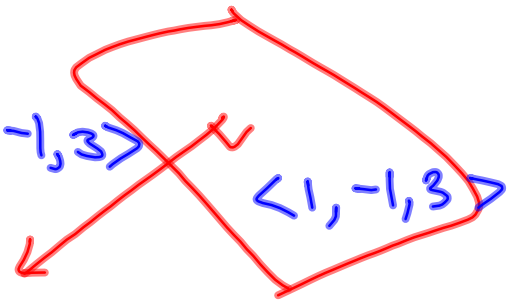
$x - 1 + y + z - 1 = 0$

$\boxed{x + y + z - 2 = 0}$

16. (a) Find parametric equations for the line through (2, 4, 6) that is perpendicular to the plane $x - y + 3z = 7$.

(b) In what points does this line intersect the coordinate planes?

$r(t) = \langle 2,4,6 \rangle + t\langle 1,-1,3 \rangle$



$x = t + 2$

$y = -t + 4$

$z = 3t + 6$

b) xy-plane ($z = 0$) $\rightarrow t = -2$

$(yz - 1,1)$ $x = 0$, $y = 6$ $(0,6,0)$

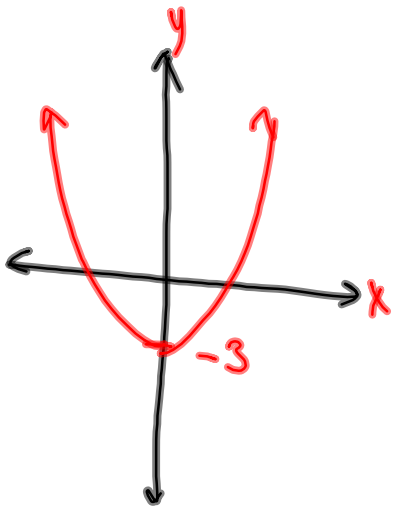
$y = 0$ (xz-plane) $\rightarrow t = 4$

$x = 6$, $z = 18$

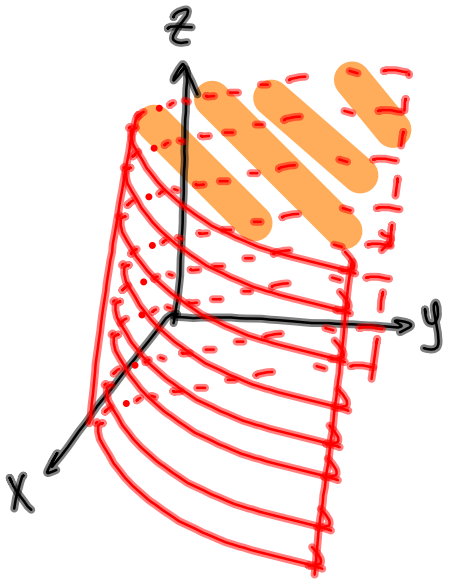
$(6,0,18)$

$y = x^2 - 3$

on xy plane



on xyz space



$x^2+z^2=1$

$z=x^2+y^2$