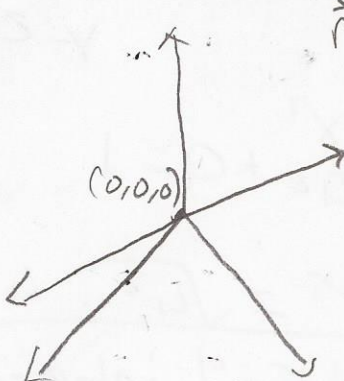


Exercise 1. Find the distance between  $Q(1, 0, 3)$  and the line  $\langle x, y, z \rangle = t\langle 2, 1, 2 \rangle$ .



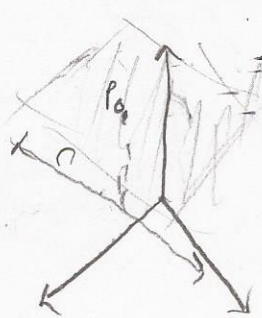
$\vec{v} = 0 + \langle 2, 1, 2 \rangle$        $Q = (1, 0, 3)$   
 $P_0 = (0, 0, 0)$

$$d = \frac{|\vec{v} \times \vec{PQ}|}{|\vec{v}|} = \frac{|\langle 2, 1, 2 \rangle \times \langle 1, 0, 3 \rangle|}{\sqrt{2^2 + 1^2 + 2^2}}$$

$\begin{array}{r} 2 \times 1 \\ 1 \times 0 \\ 2 \times 3 \\ 3 - 0, 2 - 6, 0 - 1 \end{array}$

$$= \frac{|\langle 3, -4, -1 \rangle|}{\sqrt{9}} = \frac{\sqrt{9 + 16 + 1}}{3} = \frac{\sqrt{26}}{3}$$

Exercise 2. Find the equation of the plane through the point  $P_0(2, -3, 4)$  and perpendicular to the line  $r = \langle 3 + 2t, -4t, 1 - 6t \rangle$ .



$P_0(2, -3, 4)$        $\vec{r} = \langle 3 + 2t, -4t, 1 - 6t \rangle$

$$P_0 P = \langle x - 2, y + 3, z - 4 \rangle \cdot \langle 3 + 2t, -4t, 1 - 6t \rangle$$

$$\Downarrow \langle 3, 0, 1 \rangle + t \langle 2, -4, -6 \rangle$$

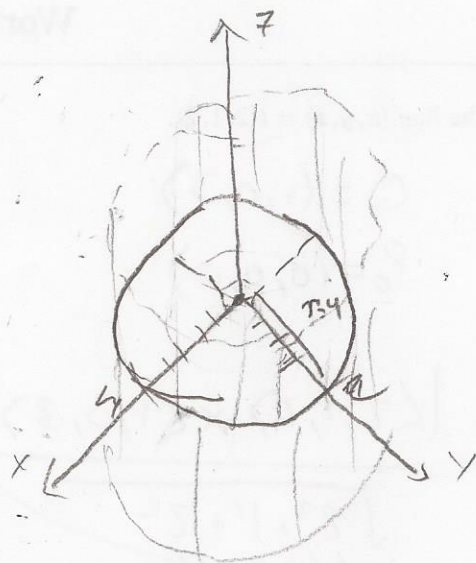
$$\langle x - 2, y + 3, z - 4 \rangle \cdot \langle 2, -4, -6 \rangle = 0$$

$$2(x - 2) - 4(y + 3) - 6(z - 4) = 0$$

Exercise 3. Sketch the cylinder  $x^2 + 4y^2 = 16$ .

Cylinder  $x^2 + 4y^2 = 16$ :

$$(x+0)^2 + 4(0+y)^2 = 4^2$$



$$\frac{x^2}{4^2} + \frac{y^2}{2^2} = 1$$

○

$$y=2$$

X-int  $\frac{x^2}{4^2} + 0 = 1$

$$x = \sqrt{4^2}$$

$x = 4$ intercepts $y = 2$
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