

1) Does each point lie on the plane $3x - 5y - 6z = 12$

a) $A(0, 0, -2)$

b) $B(1, 1, -2)$

2) Find the x -, y -, and z -intercepts of each plane.

a) $2x - 3y + 6z = 12$

b) $4x - 8z = 16$

3) Write the parametric equations of each plane given its vector equation.

a) $[x, y, z] = [3, -1, 2] + t[4, -2, 3] + s[5, 1, 0]$

b) $[x, y, z] = [0, 8, 7] + t[1, 0, -3] + s[1, -4, 7]$

4) Write the vector equation of a plane given its parametric equations.

a) $\pi: \begin{cases} x = 1 - 9t + 4s \\ y = 8 - 7t + s \\ z = -1 - 3t + 2s \end{cases}$

b) $\pi: \begin{cases} x = 4 - t - s \\ y = 3 + 4s \\ z = 2t \end{cases}$

5) Determine the x -, y -, and z -intercepts of the plane $[x, y, z] = [1, -3, 2] + t[4, -3, 5] + s[-1, 7, 0]$

6) Write a vector equation for each plane:

a) contains the origin; has direction vectors $\vec{a} = [2, -1, 7]$ and $\vec{b} = [3, 5, 2]$

b) contains the points $D(1, -2, 3)$, $E(5, -1, 8)$, and $F(3, 9, 2)$

c) contains the point $P_0(2, -1, 5)$; parallel to the xy -plane

d) has y -intercept -7 ; parallel to the plane defined by the parametric equations
$$\begin{cases} x = 7 + 3t \\ y = 6 + 2t - 5s \\ z = 1 - 8t + 3s \end{cases}$$

7) Determine the vector equation of the plane that contains the points $A(2, -1, 4)$, $B(-3, 4, 5)$, and $C(8, -1, 6)$.

8) A plane is perpendicular to $[x, y, z] = [1, -10, 8] + s[1, 2, -1]$ and contains the point $P(-1, 4, -2)$. Determine if the point $A(7, 10, 16)$ is also on this plane.

Answers:

1) **a)** Yes **b)** No

2) **a)** x-int: (6, 0, 0); y-int: (0, -4, 0); z-int: (0, 0, 2) **b)** x-int: (4, 0, 0); y-int: none; z-int: (0, 0, -2)

$$3) \mathbf{a)} \pi: \begin{cases} x = 3 + 4t + 5s \\ y = -1 - 2t + s \\ z = 2 + 3t \end{cases} \quad \mathbf{b)} \pi: \begin{cases} x = t + s \\ y = 8 - 4s \\ z = 7 - 3t + 7s \end{cases}$$

4) **a)** $[x, y, z] = [1, 8, -1] + t[-9, -7, 3] + s[4, 1, 2]$ **b)** $[x, y, z] = [4, 3, 0] + t[-1, 0, 2] + s[-1, 4, 0]$

5) x-int: $(-\frac{6}{7}, 0, 0)$; y-int: (0, -6, 0); z-int: $(0, 0, \frac{6}{5})$

6) **a)** $[x, y, z] = [0, 0, 0] + t[2, -1, 7] + s[3, 5, 2]$ **b)** $[x, y, z] = [1, -2, 3] + t[4, 1, 5] + s[2, 11, -1]$

c) $[x, y, z] = [2, -1, 5] + t[1, 0, 0] + s[0, 1, 0]$ **d)** $[x, y, z] = [0, -7, 0] + t[3, 2, -8] + s[0, -5, 3]$

7) $[x, y, z] = [2, -1, 4] + t[-5, 5, 1] + s[6, 0, 2]$

8) Not on the plane