Section 12.5 – Equations of Lines & Planes

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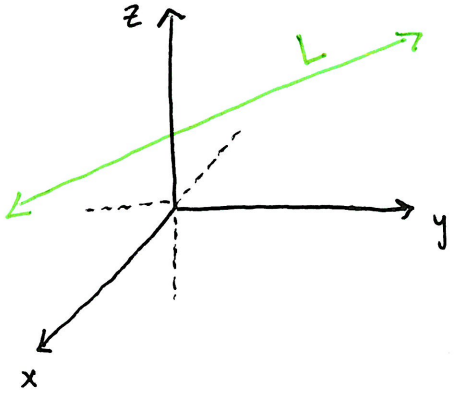
- Line in 2D: Need
- Line in 3D: Need

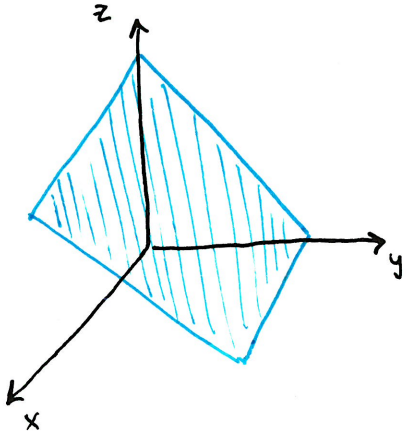


- Vector Equation:
- Parametric Equations:
- Symmetric Equations:

Example 2 (a) Find the parametric equations of the line through the points $A(2,4,-3)$ and $B(3,-1,1)$.

(b) At what point does the line intersect the xy-plane?

- Line Segment: between points r_0 and r_1
- Skew Lines:
- Planes in 3D: Need



- Vector Equation:
- Scalar Equation:
- Linear Equation:

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Example 5 Find an equation of the plane that passes through the points $P(1,3,2)$, $Q(3,-1,6)$ and $R(5,2,0)$.

Example 7 Find the angle between the planes:

$$x+y+z=1 \quad \text{and} \quad x-2y+3z=1$$

- Question: How can you determine if two planes are parallel without finding the angle between them?

Example 8 Find a formula for the distance D from a point $P_1(x_1, y_1, z_1)$ to the plane $ax+by+cz+d=0$.

- CPM 3D Plotter: technology.cpm.org/general/3dgraph/ Graph: $x+y+z=1$, $3x+y-z=2$

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- Extra Examples:

#42 sketch $3x + y + 2z = 6$ using intercepts

#48 where does the line through $(1,0,1)$ and $(4,-2,2)$ intersect the plane $x + y + z = 6$.

#52 Determine if the planes are parallel, perpendicular or neither.

$2z = 4y - x$ and $3x - 12y + 6z = 1$

#63. Find an equation of the plane with x-intercept a, y-intercept b, and z-intercept c.

#75. Show that the distance between parallel planes $ax + by + cz + d_1 = 0$ and $ax + by + cz + d_2 = 0$ is $D = \dfrac{|d_1 - d_2|}{\sqrt{a^2 + b^2 + c^2}}$