

Intersection of 2 Lines

What are the possibilities for the intersection of 2 lines in:

2-space?

3-space?

Linear Equations

Variables:

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Example (2-space): Find the intersection of the lines: $2x - y + 8 = 0$ and $5x + 3y - 13 = 0$

Example (3-space): Find the intersection of the lines: $\vec{r}_1 = (-1, 1, 0) + t(3, 4, -2)$ and $\vec{r}_2 = (-1, 0, -7) + s(2, 3, 1)$.

Solution:

Start with the parametric equations:

$$x = -1 + 3t$$

$$y = 1 + 4t$$

$$z = -2t$$

and

$$x = -1 + 2s$$

$$y = 3s$$

$$z = -7 + s$$

Combine to get:

Example: Find the intersection of the lines: $\vec{r}_1 = (2,1,0) + t(1,-1,1)$ and $\frac{x-3}{2} = \frac{y}{3} = z + 1$

Solution:

Start with the parametric equations:

$$x = 2 + t$$

$$y = 1 - t$$

$$z = t$$

and

$$x =$$

$$y =$$

$$z =$$

Example: Find the y-intercept for the line $\vec{r}_1 = (2, 1, -1) + t(1, -1, 1)$

Solution:

Start with the parametric equations:

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