

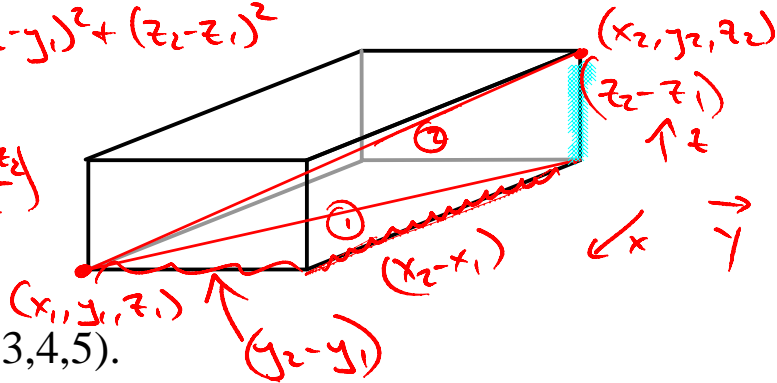
3D Distance and Midpoint

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11:31 AM

The 3-D Distance and Midpoint Formulas are:

Distance: $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2 + (z_2-z_1)^2}$

Midpoint: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}, \frac{z_1+z_2}{2}\right)$



1. Let $A = (0,0,0)$ and $B = (3,4,5)$.
 - a. Find AB

$5\sqrt{2}$

- b. Find the midpoint of segment AB .

$\left(\frac{3}{2}, 2, \frac{5}{2}\right)$

2. Let $P = (5,6,-2)$ and $Q = (2,10,10)$
 - a. Find PQ

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- b. Find the midpoint of segment PQ .

3. Let $R = (4,2,3)$ and $S = (6,1,z)$. If $RS = 10$ units, find z .

$$\sqrt{\frac{z^2 + 1^2 + (z-3)^2}{(6-4)^2 (1-2)^2}} = 10$$

$$\sqrt{5 + (z-3)^2} = 10 \rightarrow \text{Don't expand}$$

$$5 + (z-3)^2 = 100 \Rightarrow (z-3)^2 = 95$$

$$z-3 = \sqrt{95}$$

$$z = 3 + \sqrt{95}$$

$$\text{or } z-3 = -\sqrt{95}$$

$$\text{or } z = 3 - \sqrt{95}$$

4. If $(4,2,3)$ is the midpoint of the segment from $(18,-12,4)$ to (x,y,z) , find $x + y + z$.