

Dr. Z's Math251 Handout #13.1 [Vector Functions and Space Curves]

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Problem Type 13.1a: Find a vector equation and a parametric equation for the line segment joining $P(p_1, p_2, p_3)$ and $Q(q_1, q_2, q_3)$

Example Problem 13.1a: Find a vector equation and a parametric equation for the line segment joining $P(1, 0, 1)$ and $Q(2, 3, 1)$

Steps

Example

1. The vector equation for the line segment joining P and Q is $(1-t)P + tQ$ ($0 \leq t \leq 1$), i.e.

$$(1-t)\langle p_1, p_2, p_3 \rangle + t\langle q_1, q_2, q_3 \rangle \quad , \quad (0 \leq t \leq 1) \quad .$$

1.

$$(1-t)\langle 1, 0, 1 \rangle + t\langle 2, 3, 1 \rangle =$$

$$\langle 1-t, 0, 1-t \rangle + \langle 2t, 3t, t \rangle = \langle 1+t, 3t, 1 \rangle \quad ,$$

$$(0 \leq t \leq 1) \quad .$$

2. After you simplify $tP + (1-t)Q$ read-off the three components, x, y, z .

2.

$$\langle x, y, z \rangle = \langle 1+t, 3t, 1 \rangle \quad ,$$

So

$$x = 1+t \quad , \quad y = 3t \quad , \quad z = 1 \quad (0 \leq t \leq 1) \quad .$$

This is the **Ans..**