4.3.43

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Find the equation of the line through $P_1(3, -2, -5)$ and $P_2(3, -2, 6)$.

Solution

$$\mathbf{P}_1 = \begin{pmatrix} 3 \\ -2 \\ -5 \end{pmatrix}, \quad \mathbf{P}_2 = \begin{pmatrix} 3 \\ -2 \\ 6 \end{pmatrix}, \quad \vec{\mathbf{d}} = \mathbf{P}_2 - \mathbf{P}_1 = \begin{pmatrix} 0 \\ 0 \\ 11 \end{pmatrix} \sim \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}.$$

Hence a parametric (affine) description of the line is:

$$\mathbf{x} = \mathbf{p} + \lambda \vec{\mathbf{d}} = \begin{pmatrix} 3 \\ -2 \\ -5 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}, \lambda \in \mathbb{R}.$$