

1-1.8-2

EE24BTECH11005 - Arjun Pavanje

Question:

Find the distance between the following pairs of points

- 1) (2, 3, 5) and (4, 3, 1)
- 2) (-3, 7, 2) and (2, 4, -1)
- 3) (-1, 3, -4) and (1, -3, 4)
- 4) (2, -1, 3) and (-2, 1, 3)

Solution:

Variable	Description
\mathbf{a}_1	(2, 3, 5) point
\mathbf{a}_2	(4, 3, 1) point
\mathbf{b}_1	(-3, 7, 2) point
\mathbf{b}_2	(2, 4, -1) point
\mathbf{c}_1	(-1, 3, -4) point
\mathbf{c}_2	(1, -3, 4) point
\mathbf{d}_1	(2, -1, 3) point
\mathbf{d}_2	(-2, 1, 3) point

TABLE I: Variables Used

1)

$$\mathbf{a}_2 - \mathbf{a}_1 = \begin{pmatrix} 2 \\ 0 \\ -4 \end{pmatrix} \quad (1)$$

$$\|\mathbf{a}_2 - \mathbf{a}_1\| = \sqrt{(\mathbf{a}_2 - \mathbf{a}_1)^T (\mathbf{a}_2 - \mathbf{a}_1)} = \sqrt{20} \quad (2)$$

$$\text{Distance} = \sqrt{20}$$

2)

$$\mathbf{b}_2 - \mathbf{b}_1 = \begin{pmatrix} 5 \\ -3 \\ -3 \end{pmatrix} \quad (3)$$

$$\|\mathbf{b}_2 - \mathbf{b}_1\| = \sqrt{(\mathbf{b}_2 - \mathbf{b}_1)^T (\mathbf{b}_2 - \mathbf{b}_1)} = \sqrt{43} \quad (4)$$

$$\text{Distance} = \sqrt{43}$$

3)

$$c_2 - c_1 = \begin{pmatrix} 2 \\ -6 \\ 8 \end{pmatrix} \quad (5)$$

$$\|c_2 - c_1\| = \sqrt{(c_2 - c_1)^T (c_2 - c_1)} = \sqrt{104} \quad (6)$$

$$\text{Distance} = \sqrt{104}$$

4)

$$d_2 - d_1 = \begin{pmatrix} -4 \\ 2 \\ 0 \end{pmatrix} \quad (7)$$

$$\|d_2 - d_1\| = \sqrt{(d_2 - d_1)^T (d_2 - d_1)} = \sqrt{20} \quad (8)$$

$$\text{Distance} = \sqrt{20}$$

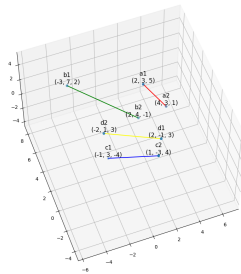


Fig. 1: Plot of the points