VECTORS

1 10^{th} Maths - Chapter 10

This is Problem-3 from Exercise 10.3

1. Find the projection of the vector $\hat{i} - \hat{j}$ on the vector $\hat{i} + \hat{j}$

2 SOLUTION

Taken points are

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \mathbf{B} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \tag{1}$$

The formula of the projection vector :

$$\frac{A\top t \times B}{\|B\|^2} \times B \tag{2}$$

Find the projection vector:

$$A\top t \times B = (1, -1) \times \begin{pmatrix} 1 \\ 1 \end{pmatrix} = (1 \times 1) + (1 \times -1) = 0 \tag{3}$$

$$\|B\|^2 = (B\top t \times B) = (1, 1) \begin{pmatrix} 1 \\ 1 \end{pmatrix} = (1 \times 1) + (1 \times 1) = 2 \tag{4}$$

projection vector =

$$\frac{A\top t \times B}{\|B\|^2} \times B = \frac{0}{2} \times \begin{pmatrix} 1 \\ 1 \end{pmatrix} = (0, 0) \tag{5}$$

projection vector = (0,0)

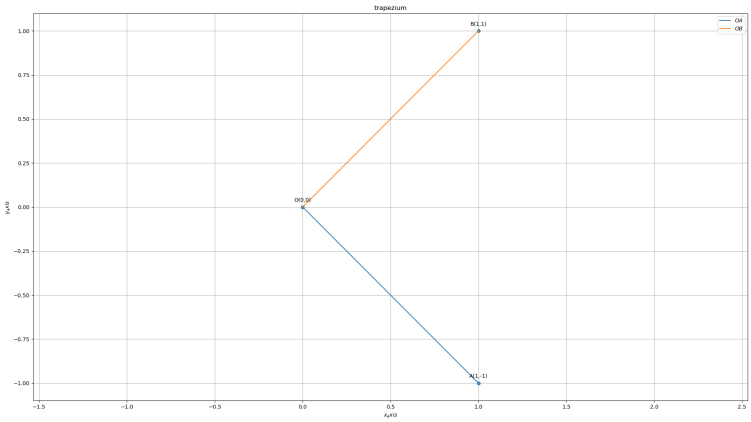
trapezium
OA
OB
B(1,1)
O(0,0)
A(1,-1)
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0
2.5

Figure 1