# SM5083
# Assignment Number 01

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SM21MTECH12003

1. Chapter II Ex-2 Q.2 II

1.1. Find the distance between the following pair of points (-13,-3) and (-4,15) with axes inclined at 60 degrees.
**Solution:**
let

$$\mathbf{A} = \begin{pmatrix} -13 \\ -3 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -4 \\ 15 \end{pmatrix} \qquad (1.1.1)$$

And the transform vector(which can be formed by locating where i and j lands after transformation) is given by,

$$\mathbf{X} = \begin{pmatrix} 1 & cos60 \\ 1 & sin60 \end{pmatrix} \qquad (1.1.2)$$

Let
$X.A = P$ and $X.B = Q$ represent the points on the plane with axes inclined at 60 degrees
Now the normalisation of vector $P$ and vector $Q$ after transformation,

$$\|\mathbf{Q} - \mathbf{P}\|^2 = (\mathbf{Q} - \mathbf{P})^\top(\mathbf{Q} - \mathbf{P}) = \begin{pmatrix} 18.0 & 15.588 \end{pmatrix}\begin{pmatrix} 18.0 \\ 15.588 \end{pmatrix}$$

$\|\mathbf{Q} - \mathbf{P}\| = \sqrt{((18.0)^2 + (15.588)^2)}$
$\|\mathbf{Q} - \mathbf{P}\| = 28.11$

Distance between A and B when the axes are inclined at 60 degrees is 28.11