1.5.8

EE25BTECH11020 - Darsh Pankaj Gajare

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Question:
Line joining the points $(3,-4)$ and $(-2,6)$ is perpendicular to the line joining the points $(-3,6)$ and $(9,-18)$.
Solution:

Table: Given Data

A	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$
B	$\begin{pmatrix} -2 \\ 6 \end{pmatrix}$
C	$\begin{pmatrix} -3 \\ 6 \end{pmatrix}$
D	$\begin{pmatrix} 9 \\ -18 \end{pmatrix}$

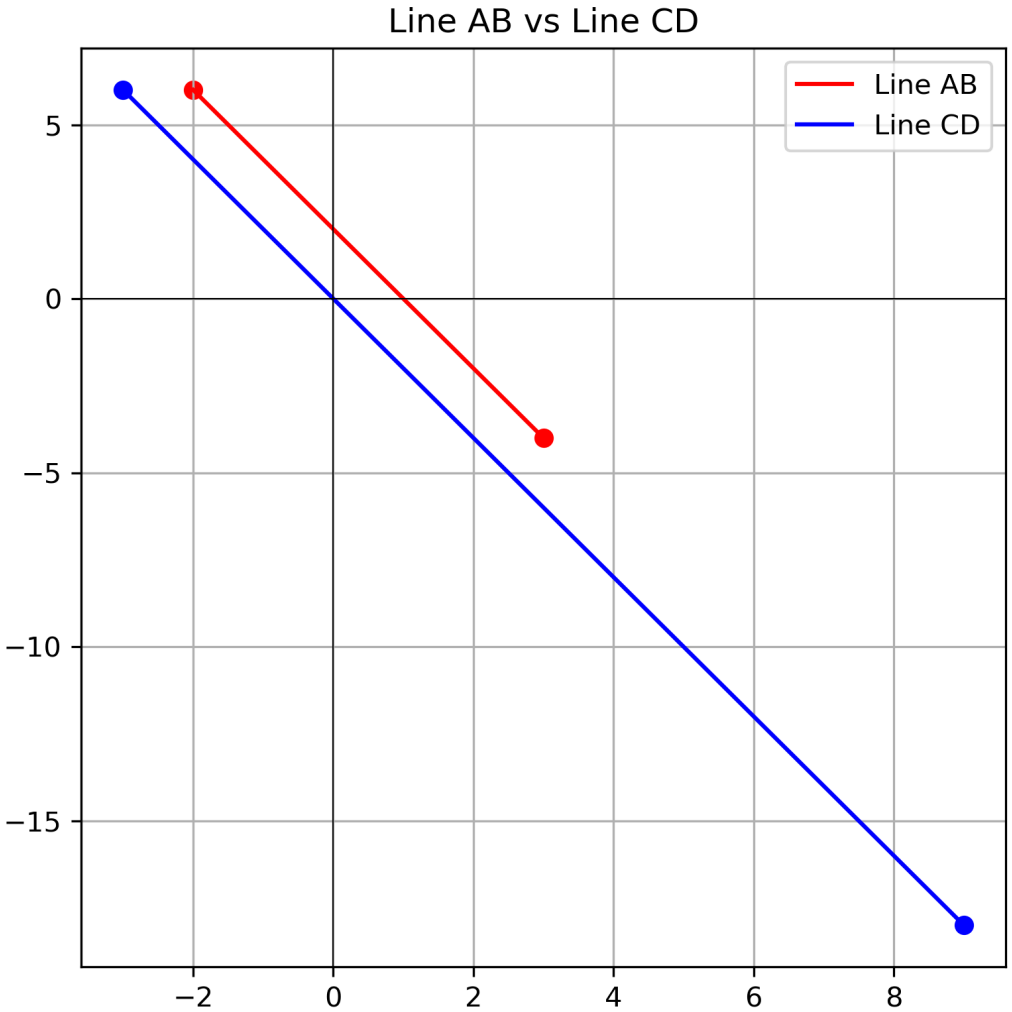
Let θ be the angle between the lines

$$\mathbf{A}-\mathbf{B}=\begin{pmatrix} 5 \\ -10 \end{pmatrix}, \mathbf{C}-\mathbf{D}=\begin{pmatrix} -12 \\ 24 \end{pmatrix} \tag{0.1}$$

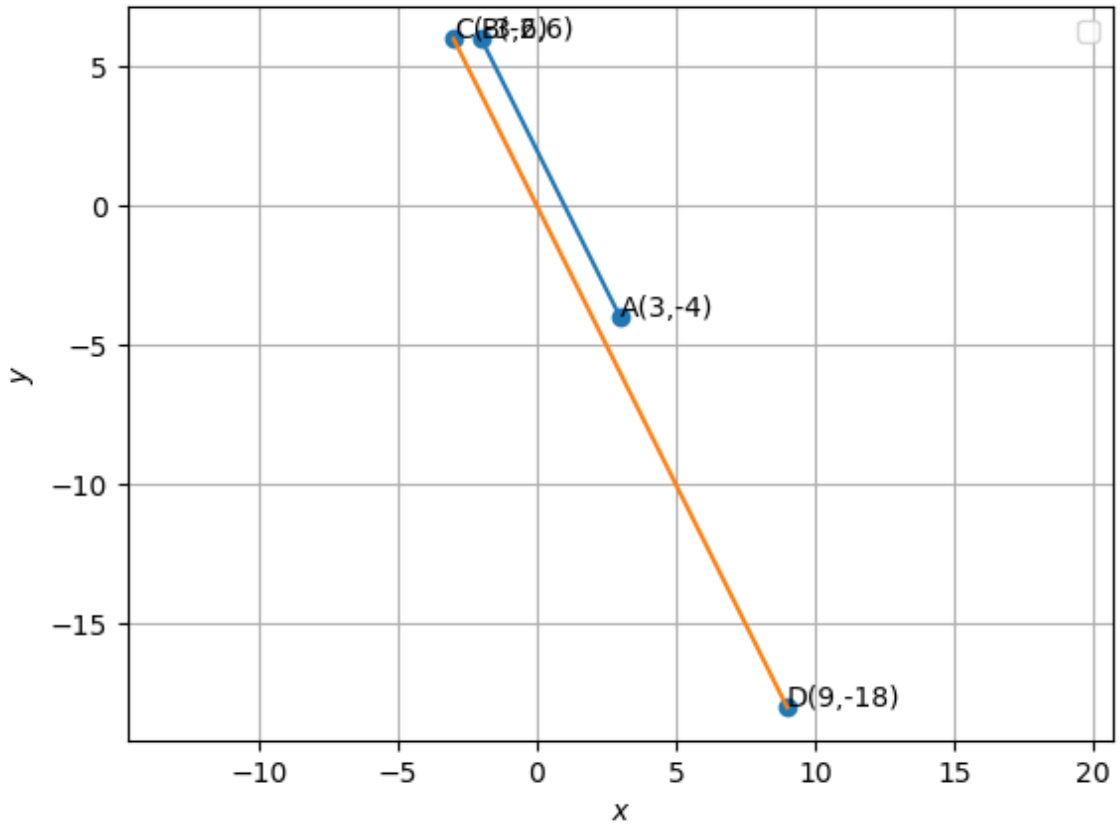
$$cos\theta = \frac{(\mathbf{A}-\mathbf{B})^T(\mathbf{C}-\mathbf{D})}{\|\mathbf{A}-\mathbf{B}\|\|\mathbf{C}-\mathbf{D}\|} \tag{0.2}$$

$$cos\theta = 1 \tag{0.3}$$

For lines to be perpendicular, $cos\theta$ should be $= 0$, hence the lines are not perpendicular



Plot using C libraries:



Plot using Python: