Question 1.7.12:

Find the value of k, if the points $P(5,4)$, $Q(7,k)$ and $R(9,-2)$ are collinear.

Hint: Three points $P(x_1,y_1)$, $Q(x_2,y_2)$, $R(x_3,y_3)$ are collinear if the area of the triangle formed by them is zero.

Solution

QUESTION

Find the value of a, if the distance between the points $A\begin{pmatrix}-3\\-14\end{pmatrix}$ and $B\begin{pmatrix}a\\-5\end{pmatrix}$ is 9 units.

SOLUTION

$$\mathbf{A} = \begin{pmatrix}-3\\-14\end{pmatrix}, \quad \mathbf{B} = \begin{pmatrix}a\\-5\end{pmatrix} \tag{1}$$

$$\|\mathbf{A}-\mathbf{B}\| = 9 \tag{2}$$

$$\implies \left\|\begin{pmatrix}-3\\-14\end{pmatrix} - \begin{pmatrix}a\\-5\end{pmatrix}\right\| = 9 \tag{3}$$

$$\implies \left\|\begin{pmatrix}-3-a\\-9\end{pmatrix}\right\| = 9 \tag{4}$$

$$\implies (-3-a)^2 + (-9)^2 = 9^2 \tag{5}$$

$$(a+3)^2 + 81 = 81 \tag{6}$$

$$(a+3)^2 = 0 \tag{7}$$

$$a = -3 \tag{8}$$

$$\boxed{a = -3} \tag{9}$$

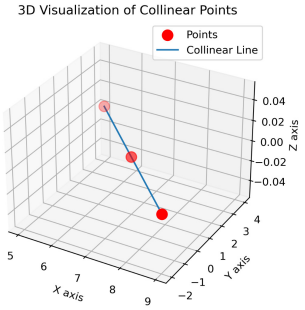
3D Visualization of Collinear Points
Points
Collinear Line
X axis
Y axis
Z axis
5
6
7
8
9
−2
−1
0
1
2
3
4
0.04
0.02
0.00
−0.02
−0.04

Fig. 1