1.1.6.9

EE24BTECH11030 - J.KEDARANANDA

Question:
If three points $(h,0)$,(a,b) and $(0,k)$ lie on a line, show that $\frac{a}{h}+\frac{b}{k}=1$

Solution:

Variable	Description	Formula
$\begin{pmatrix}x_1\\y_1\end{pmatrix}$	x,y coordinate of P respectively	$\frac{k(\mathbf{B})+(\mathbf{A})}{k+1}$
$\begin{pmatrix}x_2\\y_2\end{pmatrix}$	x,y coordinate of Q respectively	$\frac{k(\mathbf{B})+(\mathbf{A})}{k+1}$
$\begin{pmatrix}2\\-2\end{pmatrix}$	x,y coordinate of A respectively	
$\begin{pmatrix}-7\\4\end{pmatrix}$	x,y coordinate of B respectively	

TABLE 0: Variables Used

As given points lie on same line its determinant value should be equal to 0.

$$\begin{vmatrix} h & 0 & 1 \\ a & b & 1 \\ 0 & k & 1 \end{vmatrix} = 0 \tag{0.1}$$

expanding the det by column 1.

$$1\begin{vmatrix} h & 0 \\ a & b \end{vmatrix} - 1\begin{vmatrix} h & 0 \\ 0 & k \end{vmatrix} + 1\begin{vmatrix} h & 0 \\ a & b \end{vmatrix} \tag{0.2}$$

$$hb - hk + hb = 0 \tag{0.3}$$

$$2hb - hk = 02b = k \tag{0.4}$$

simillarly

$$2a = h \tag{0.5}$$

$$\frac{a}{h}+\frac{b}{k}=1 \tag{0.6}$$

lets take 3 points as an example and check whether they follow our line equation or not (2,0)(1,2)(0,4)

$$\frac{a}{h} + \frac{b}{k} \tag{0.7}$$

$$\frac{1}{2} + \frac{2}{4} = 1 \tag{0.8}$$

these points satisfy our line equation

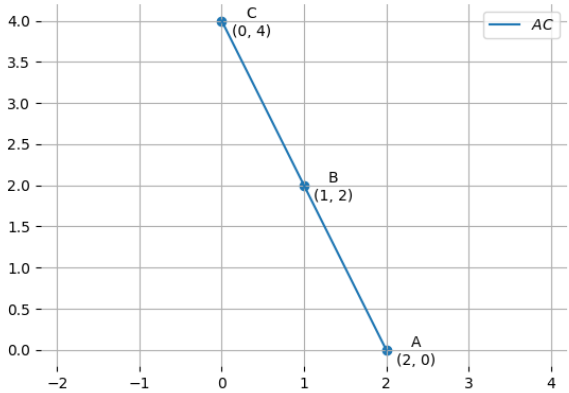

Fig. 0.1: Stem Plot of y(n)