Q5

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Answer:

Clearly, x is a sequence of length $5 + 1 - 3 = 3$, then x can be written as $< a, b, c >$.

We transform the x and $< 1, 1, -1 >$ into corresponding polynomial

$$P_A(x) = a + bx + cx^2$$

$$P_B(x) = 1 + x - x^2$$

We multiply P_A and P_B

$$P_A(x) \cdot P_B(x) = \sum_{j=0}^{4} \left(\sum_{i=0}^{j} A_i \cdot B_{j-i} \right) x^j$$

$$= a + (a + b)x + (c + b - a)x^2 + (c - b)x^3 - cx^4$$

The corresponding polynomial of sequence $< 1, 0, -1, 2, -1 >$ is

$$P_c(x) = 1 - x^2 + 2x^3 - x^4$$

Since $P_c(x) = P_A(x) \cdot P_B(x)$ then we got,

$$a = 1$$

$$a + b = 0$$

$$c + b - a = -1$$

$$c - b = 2$$

$$c = 1$$

Hence,

$$a = 1$$

$$b = -1$$

$$c = 1$$

Finally, the sequence x will be $< 1, -1, 1 >$.