

## ASSIGNMENT2 QUESTION 5

5. Find the sequence  $x$  satisfying  $x * \langle 1, 1, -1 \rangle = \langle 1, 0, -1, 2, -1 \rangle$ . (20 pts)

**Answer:**

Clearly  $x$  is a sequence of length  $5 + 1 - 3 = 3$ ; We can write it as  $\langle a, b, c \rangle$ . For  $\text{seq} = \langle 1, 1, -1 \rangle$  the associated polynomial is  $1 + x - x^2$ ; For  $\langle a, b, c \rangle$  the associated polynomial is  $a + bx + cx^2$ . We multiply them and get

$$\begin{aligned} (1 + x - x^2) \cdot (a + bx + cx^2) &= a + bx + cx^2 + ax + bx^2 + cx^3 - ax^2 - bx^3 - cx^4 \\ &= a + (a + b)x + (c + b - a)x^2 + (c - b)x^3 + (-c)x^4 \end{aligned}$$

We can know that the  $\langle 1, 0, -1, 2, -1 \rangle$ .

the associated polynomial is  $1 - x^2 + 2x^3 - x^4$

We can know that  $a = 1, a + b = 0, c + b - a = -1, c - b = 2, -c = -1$

So  $a = 1, b = -1, c = 1$  we can get  $x = \langle 1, -1, 1 \rangle$