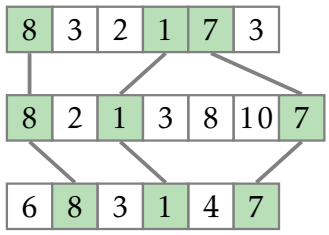
5.2.5 Longest Common Subsequence of Three Sequences

Longest Common Subsequence of Three Sequences Problem
Compute the maximum length of a common subsequence of three sequences.

Input: Three sequences.
Output: The maximum length of a common subsequence.



Given three sequences $A = (a_1, a_2, \ldots, a_n)$, $B = (b_1, b_2, \ldots, b_m)$, and $C = (c_1, c_2, \ldots, c_l)$, find the length of their longest common subsequence, i.e., the largest non-negative integer p such that there exist indices

$$1 \leq i_1 < i_2 < \cdots < i_p \leq n,$$
$$1 \leq j_1 < j_2 < \cdots < j_p \leq m,$$
$$1 \leq k_1 < k_2 < \cdots < k_p \leq l$$

such that

$$\begin{aligned} a_{i_1} &= b_{j_1} = c_{k_1}, \\ a_{i_2} &= b_{j_2} = c_{k_2}, \\ &\vdots \\ a_{i_p} &= b_{j_p} = c_{k_p}. \end{aligned}$$

Input format. First line: n. Second line: $a_1, a_2, \ldots, a_n$. Third line: m. Fourth line: $b_1, b_2, \ldots, b_m$. Fifth line: l. Sixth line: $c_1, c_2, \ldots, c_l$.

Output format. p.

Constraints. $1 \leq n, m, l \leq 100$; $-10^9 \leq a_i, b_i, c_i \leq 10^9$.

Sample 1.

Input:

```
3
1 2 3
3
2 1 3
3
1 3 5
```

Output:

```
2
```

A common subsequence of length 2 is $(1, 3)$.

Sample 2.

Input:

```
5
8 3 2 1 7
7
8 2 1 3 8 10 7
6
6 8 3 1 4 7
```

Output:

```
3
```

One common subsequence of length 3 in this case is $(8, 3, 7)$. Another one is $(8, 1, 7)$.