Frog III

The frog from the previous problems now has a list of the K different distances that can jump.
There are N stones numbered 1, 2, ..., N, and each of them is positioned 1 meter apart. The frog is initially on the ground 1 meter from the first stone and wants to reach stone N.
Find how many different ways the frog can get to stone N.

Input

The first line has N and K. The following line has K numbers separated by a space.

Output

An integer representing the different ways the frog can get to stone N.

Frog III

Sample 1

Input	Output
5 4 1 3 4 5	7

Sample 2

Input	Output
5 2 4 5	1

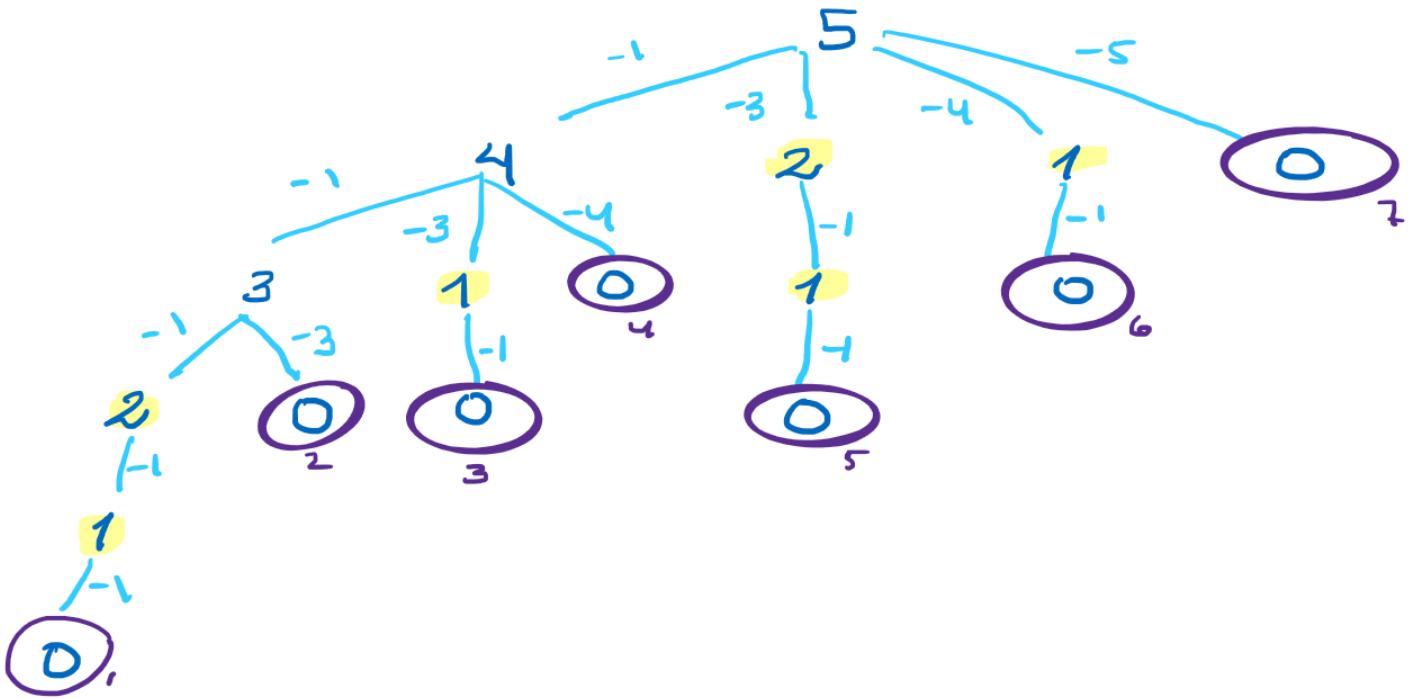
Frog III

Sample 1

Input	Output
5 4 1 3 4 5	7

Frog III: Top-down DP

F(s) = The number of ways to reach s. Where $1 \leq s \leq n$



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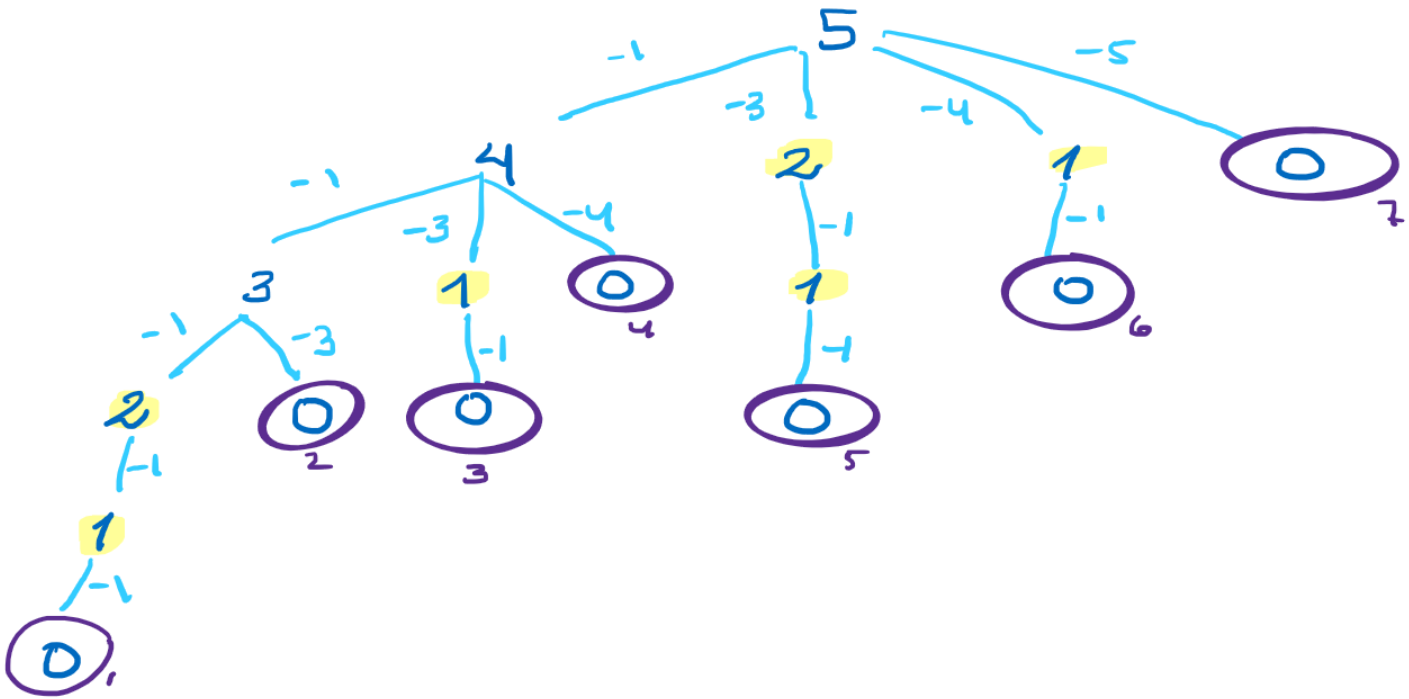

$$F(n) = \sum_{0}^{k} F(n - \text{jumps}(i))$$

Frog III: Top-down DP

```
public int count(int n, int[] jumps, int[] dp) {
    if (n < 0) {
        return 0;
    }
    if (n == 0) {
        return 1;
    }
    if (dp[n] != -1) {
        return dp[n];
    }

    dp[n] = 0;
    for (int i = 0; i < jumps.length; i++) {
        dp[n] += count(n - jumps[i], jumps, dp);
    }
    return dp[n];
}
```

Frog III: Bottom-up DP

F(s) = The number of ways to reach s. Where $1 \leq s \leq n$

$n = 5$ $\quad jumps = \{1, 3, 4, 5\}$

dp

BC = 0 = 1

1 = 1 → dp[1-1]

2 = 1 → dp[2-1]

3 = 2 → dp[3-1] + dp[3-3]

4 = 4 → dp[4-1] + dp[4-3] + dp[4-4]

5 = 7 → dp[5-1] + dp[5-3] + dp[5-4] + dp[5-5]

Frog III: Bottom-up DP

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$$F(n) = \sum_{0}^{k} F(n - \text{jumps}(i))$$

\fi

Frog III: Bottom-up DP

```
public int count(int n, int[] jumps, int[] dp) {
  dp[0] = 1;
  for (int i = 1; i <= n; i++) {
     for (int j = 0; j < jumps.length; j++) {
        if (i - jumps[j] >= 0) {
           dp[i] += dp[i - jumps[j]];
        }
     }
  }
  return dp[n];
}
```

Frog III

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