Data Structures

Quiz - 3

Question:

Define the sequence with initial conditions $X_1 = 1$, $X_2 = 2$, $X_3 = 3$, and recurrence relation:

$$X_{n+2} = X_{n+1} \cdot X_n - X_{n-1}$$

Write a recursive method to calculate the n-th term of this sequence. Ensure that the method runs in linear time.

Solution:

```java
public static int[] helper(int n) {
    if (n == 2) return new int[]{3,2,1};
    else {
        int[] prev = helper(n-1);
        return new int[]{prev[0] * prev[1] - prev[2], prev[0], prev[1]};
    }
}

public static int method(int n) {
    return helper(n)[1];
}
```