Buy and Sell Stock II

ex prices = [7, 1, 5, 3, 6, 4]

→ Why Recursion?

→ Let's analyses the question

~~B~~ B ~~S~~ S
7 1 5 3 6 4
↑
assume start from here

When I starting of (from idx = 0) I can buy or skip it and buy at idx = 1 and sell at idx = 2 or skip idx = 2 and sell at idx = 3 or there are

A ~~lot~~ lot of ways.

↓

Try all ways

↓

Best Answer

↓

Recursion

How to write Recurrance

(1) Express everything in terms of index.

$f(idx, buy)$

On any index I have to know wether I have baught previously or not. So buy variable tells us that on the particular index can I buy or not

(2) Explore all possibilities on that idx.

(3) Take the maximum all profits made.

(4) Base case.

Recourrunce

$f(0,1)$ 0 ← Buy → 1 you can buy
0 → sell it
→ starting on 0th day with buy what max profit you can give me?

0	1	2	3	4	5
7	1	5	3	6	4

```
f(idx, buy)
{   if (idx == n)
      return 0;

    // buy=1 that mean you can buy the stock
    if (buy)
    { profit = max{ -prices[idx] + f(idx+1, 0)   → take
                  { 0 + f(idx+1, 1)              → Not take
    }
    else // sell the stock bcz you previously bought a stock
    { profit = max{ prices[idx] + f(idx+1, 1)    → sell
                  { 0 + f(idx+1, 0)              → Not sell
    }
return profit;
```

at the nth day their might a possibility that you buy a stock and not sell it.

$T.C = O(2^n)$

$S.C = O(N$

Memoization

idx → 0 to N

buy → 0 / 1

dp[N][2];

$T.C = O(N*2)$

$S.C = O(N*2) + O(N)$

Tabulation

1. Base case
2. changing parameters → i, → buy
3. copy the recurrance.

① Base case idx == n return 0;

dp[N+1][2]

and dp[N][0] = dp[N][1] = 0

② In Recursion i goes 0 to n

i → n-1 to 0

buy → 0 → 1