CS208 · Algorithm Design

Assignment 6

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1 Chapter 6

1.1 Exercise 2

1. It is invalid when

	week 1	week 2	week 3
l	1	1	1
h	1	3	5

AS the algorithm said, it will choose no job in week 1, high-stress job in week 2, which will get 3 value. However, the optimal value should be 6 when low-stress job in week 1, no job in week 2 and high-stress job in week 3.

2. Suppose we use $OPT(i)$ denotes the optimal value we can get until week i. If we choose no job in week $i-1$, then we can do high-stress job in this week, totally $h_i + OPT(i-2)$; if we choose low-stress job in week $i-1$, then we can do low-stress job in this week, totally $l_i + OPT(i-1)$. Then we can get the state transition equation as

$$OPT(i) = \max(l_i + OPT(i-1), h_i + OPT(i-2))$$

where $i = 3, 4, ..., n$ and $OPT(1) = \max(l_1, h_1)$ and $OPT(2) = \max(l_2 + OPT(1), h_2)$. Therefore, we can construct the algorithm as

```
func optimal_value(l, h) -> val
    Initialize: OPT = [max(l[1], h[1]), max(l[2]+OPT[1], h[2])]
    For i = 3 -> n
        OPT.append(max(l[i]+OPT[i-1], h[i]+OPT[i-2]))
    Endfor
    val = OPT[n]
Endfunc
```

Obviously, the time complexity is $O(n)$.