198 - House Robber

0   1   2   3

$ 1 $ 8 $ 4 $ 3

$$A = [1, 8, 4, 3]$$

if I only have one house, I can rob only that house.

if I have 2 houses, I can rob the max of house 0 and house 1.

if there's 3 houses I can rob the new house (house 2) + house 0 $\overline{OR}$ just keep earnings from house 1.

Therefore,

house 0   house 2   house 1

$$f(i) = \max\left(f(i-2) + A[i], f(i-1) \right)$$

         0 1 2 3

For $A = [1, 8, 4, 3]$

$f(0) = 1;$

$f(1) = \max(f(0), f(1)) = 8;$

$f(2) = \max(f(0) + A[2], f(1)) = 8$
$\qquad\qquad\quad 1 + 4 \quad , \quad 8$

$f(3) = \max(f(1) + A[3], f(2)) = 11$
$\qquad\qquad\quad 8 + 3 \quad , \quad 4$

For $A = [50, 1, 1, \overset{\checkmark}{50}]$

$f(0) = 50;$

$f(1) = \max(f(0), f(1)) = 50;$

$f(2) = \max(f(0) + A[2], f(1)) = 51$

$f(3) = \max(f(1) + A[3], f(2)) = 100$
$\qquad\qquad\qquad\qquad 100$