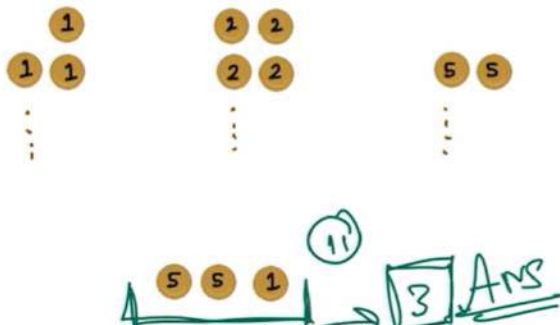


LEETCODE: COIN CHANGE

Question: Given an integer array that represents coin denominations. Determine the fewest number of coins you need to achieve a total given 'amount'.



[1 , 2 , 5]
amount = 11



[5]
amount = 6 X

5, 10, 15

-1 ← Ans

[3]
amount = 0

0 ← Ans

GREEDY APPROACH GIVES WRONG ANSWER

Greed Criteria: I want minimum coins, so I will be greedy and try to choose the coin with maximum denomination first

① ② ⑤

amount = 11

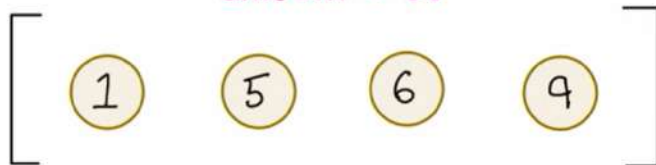
$\left[\begin{array}{l} 5 \\ 5 \\ 1 \end{array} \right]$
 \downarrow
 $-5 \Rightarrow 6$
 $-5 \Rightarrow 1$
 $-1 \Rightarrow 0$
3 COINS \rightarrow Ans



2 coins
 $\left[\begin{array}{l} 5 \\ 6 \end{array} \right]$
amount = 11
 $-9 \Rightarrow 2$
 $-1 \Rightarrow 1$
 $-1 \Rightarrow 0$
3 coins $\left[\begin{array}{l} 9 \\ 1 \\ 1 \end{array} \right]$

BUILDING AN EFFICIENT SOLUTION

amount = 11



| amount | [0] | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] |
|------------------|-----|-----|---------|---------|----------|-----|-----|---------|---------|-----|---------|---------|
| min coins needed | | ● | ●● ● | ●● ● | ●● ●● | ● | ● | ●● ● | ●● ● | ● | ●● ● | ●● ● |

● represents the coin we pick + "how many more coins we need"

amount to make = 11

coin choice = ① + 2 = 3

remainder = 10

$$\left| \begin{array}{l} \textcircled{5} + 1 = 2 \\ 6 \end{array} \right.$$

$$\left| \begin{array}{l} \textcircled{6} + 1 = 2 \\ 5 \end{array} \right.$$

$$\left| \begin{array}{l} \textcircled{9} + 2 = 3 \\ 2 \end{array} \right.$$