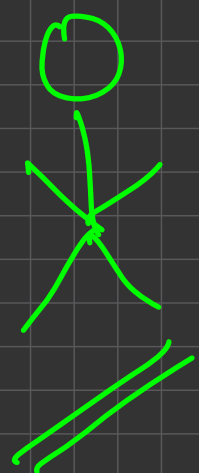


value
weight

10	30	15	9	40
1	8	2	1	10

n items

$\leq W$



has a bag with capacity of

$W = 11$

W weight, find out the
maximum value you can get

10	30	15	9	40
1	8	2	1	10

✓ ✗ ✗ ✓ ✗
 ✓ ✓ ✗ ✗ ✗

weight = 2

value = 19

weight = 9

value = 40

capacity = 11

n

2^n

combinations

Does a greedy solution work \times

picking and not picking idea 2^n ✓

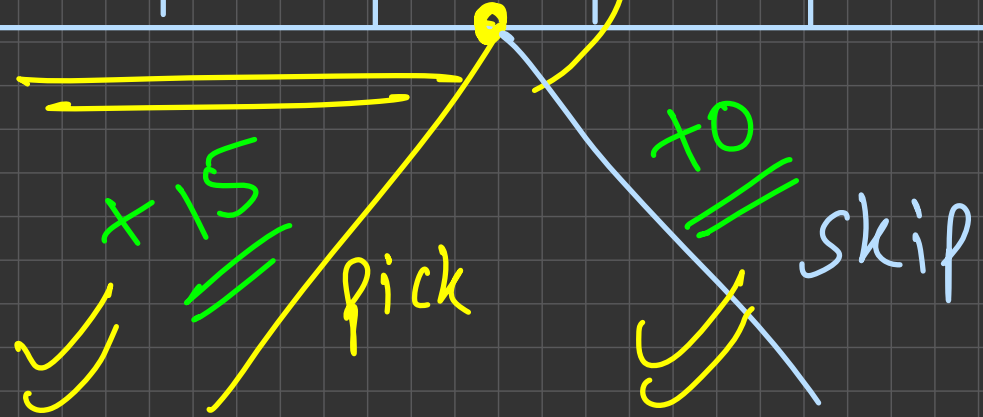
Breaking the problem into prefix
or suffix

$n=100$

p_1

10	30	15	9	40
1	8	2	1	10

$W = 11$



p_2

2

10	30
1	8

9

10	30
1	8

p_3

4

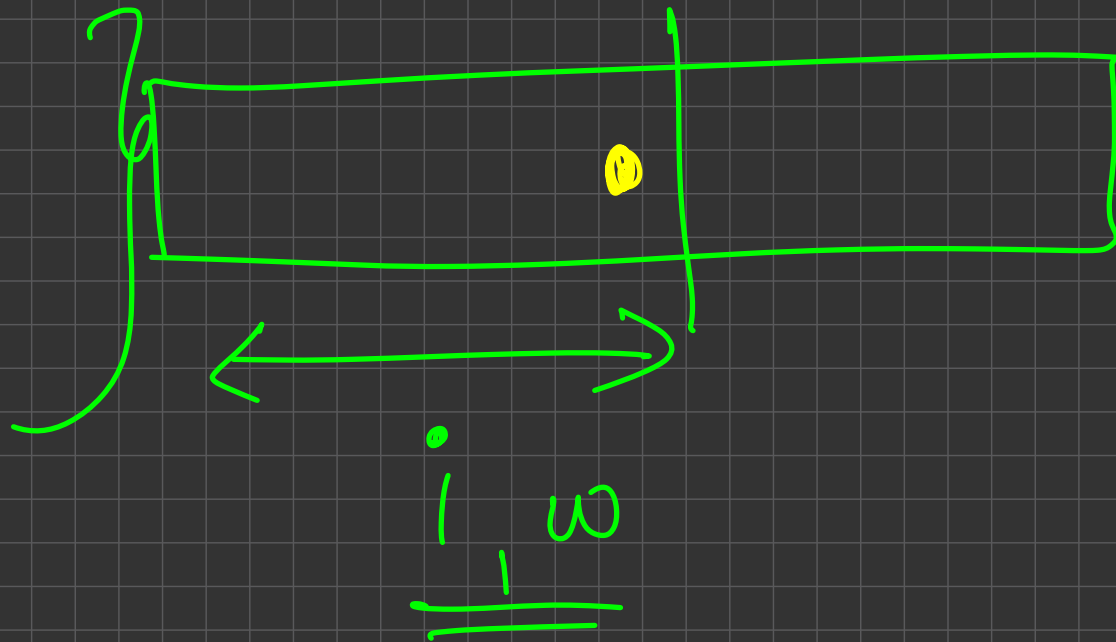
10	30	15	9	40
1	8	2	1	10

prefix length of 3 and capacity =

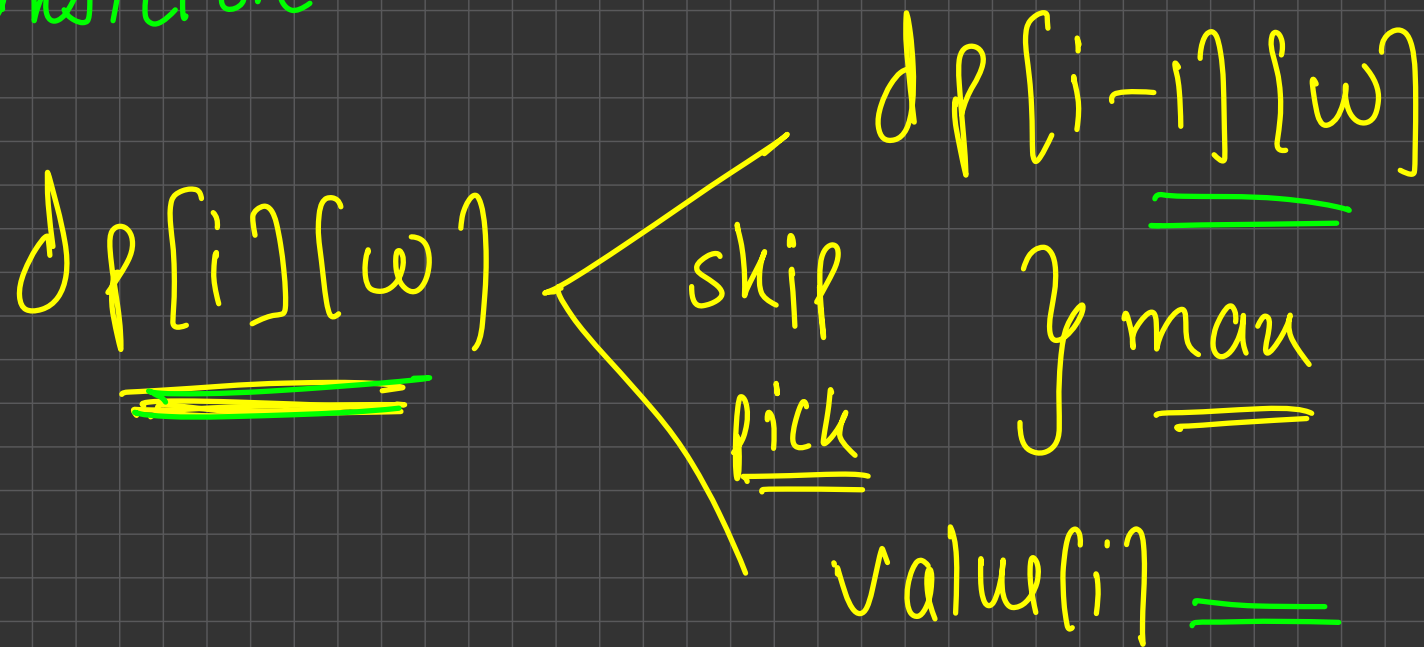
① pick : value[3] + { prefix length = 2
 Capacity = 11 - weight[3]

② skip : { prefix length = 2
 capacity = 11

$dp[i][w]$ = maximum value that we
can get for the set of length 'i'
s.t the allowed capacity is 'w'



transition



Base case:

$$\underline{\underline{dp[0][anything] = 0}}$$

n items, X capacity
 $dp[n][x]$

Time complexity

states \times avg T.T.

$O(n \cdot x) \times \underline{\underline{O(1)}}$

$$\underline{\underline{dp[i][j]}} \leftarrow \begin{array}{l} \underline{\underline{dp[i-1][j]}} \quad \underline{\underline{O(x)}} \\ \underline{\underline{dp[i-1][j - \text{some value}]} \end{array}$$

