vals: 60 100 120
wts: 20 10 50
W = 50

Greedily picking largest vals does not work.

vals: 60 100 500
wts: 10 20 50
W = 50

Greedily picking smallest wts does not work.

vals: 60 100 120
wts: 20 40 50 ~~150~~ 125 70
W = 90

Greedily combination of above 2. does not work.

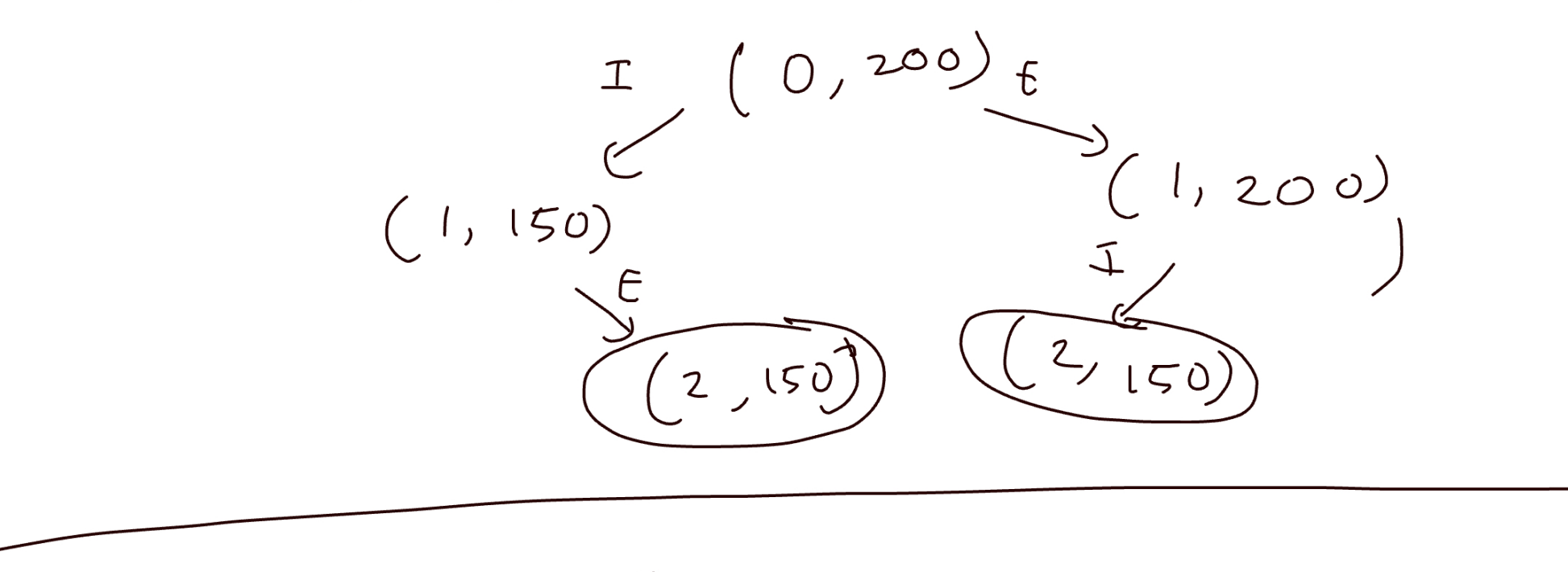
n

$\frac{2}{0}\ \frac{2}{1}\ \frac{2}{2}\ \frac{2}{-}\ \cdots\ \frac{2}{n-1}$

2^n

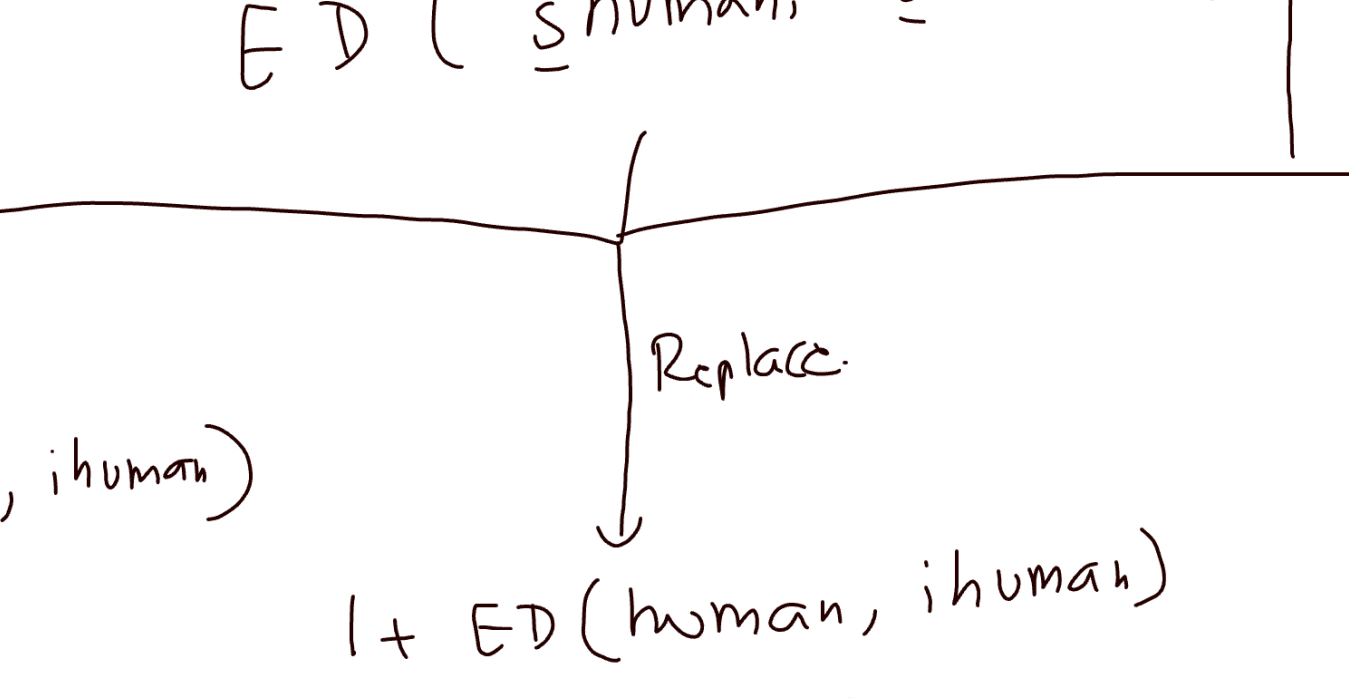
F(i, w) — include. → vals[i] + F(i+1, W - wts[i])
— exclude. → F(i+1, W).

max. of the 2 possibilities.


min(n, W)
n
(n, w)
(n-1, w-1)
(n-1, w)
(n-2, w-2)
(n-2, w-1)
(n-2, w-1)
(n-2, w)

n < w → n
n > w → max(w, n) = n

vals: 10 20 30 40
wts: 50 50 60 100
W = 200.


I
(0, 200)
E
(1, 150)
(1, 200)
E
I
(2, 150)
(2, 150)

A = Anshuman
B = Antihuman.

ED(A, B) = ED(n shuman, ntihuman) (i+1, j+1)
↓
ED(shuman, tihuman)

dabc eabcd

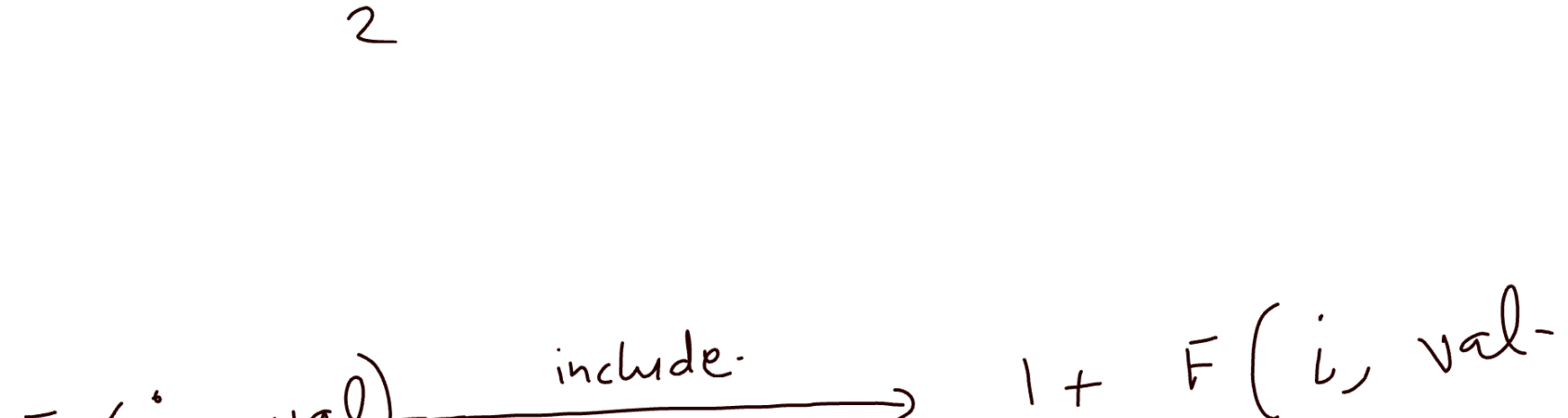
Insert → 1+ ED(shoman, ihuman) (i, j+1)

Replace. → 1+ ED(human, ihuman) (i+1, j+1)

Delete. → 1+ ED(human, tihuman) (i+1, j)

A = "" B = "abc" → o/p = 3
A = "abc" B = "" → o/p = 3

A = a B = abc (0 1 2)
↓
A = "" B = bc


m
n
(i, j)
(i, j+1)
(i+1, j+1)
(i+1, j)
(i, j+2)
(i+1, j+2)
(i+1, j+1)

→ c
→ 3c
→ 3^2c.
H = max(n, m).

$\Rightarrow TC = O(3^H) = O(3^{\max(n,m)})$

---

val = 10.
[2, 3, 4, 5]
↓
2

val: 10
[1, 2, 3, 5, 6]
↓
2

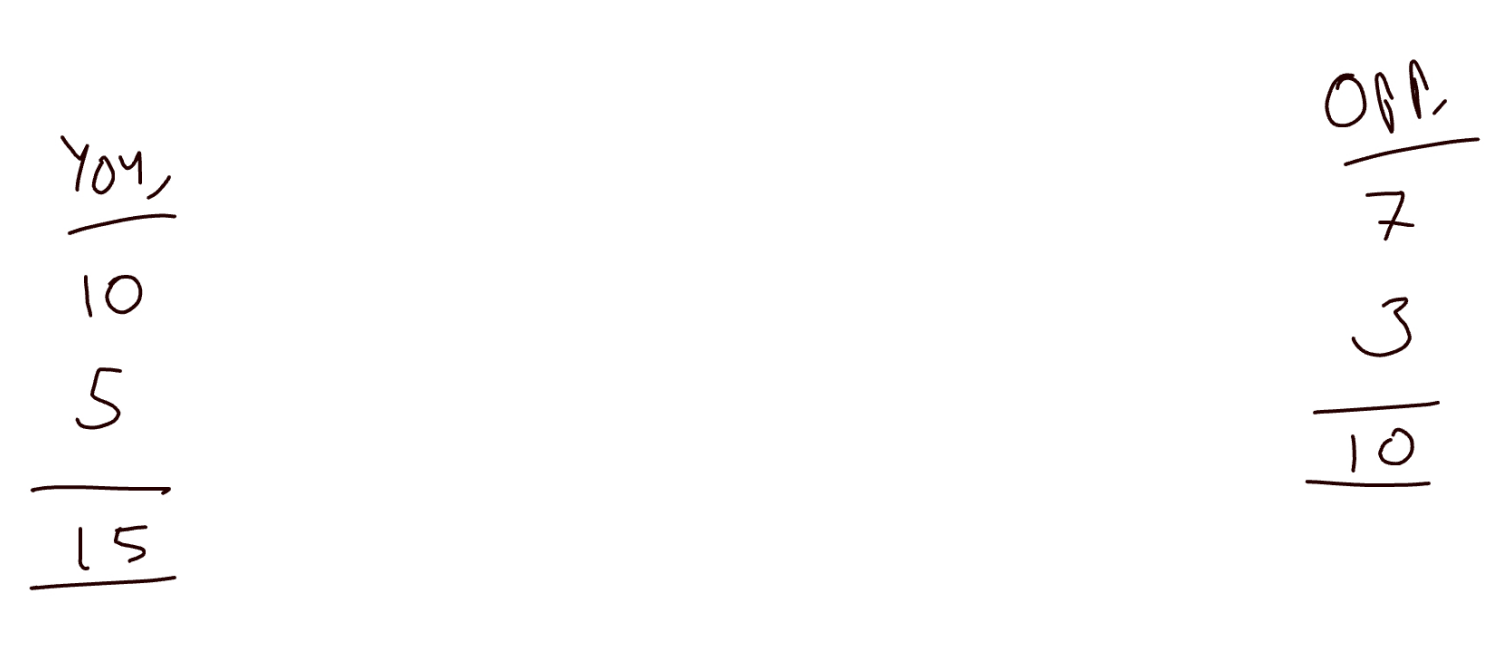
~~10~~ ~~9~~ ~~7~~ ~~4~~ 0

~~4~~ ~~2~~ 3

F(i, val) — include. → 1+ F(i, val - coins[i])
— exclude. → F(i+1, val)

min.

value ≤ 10^5.


val
n
(n, val)
(n, val-1)
(n-1, val)
(n, val-2)
(n-1, val-1)
(n-1, val-1)
(n-2, val)

H = max(n, val).
TC = $O(2^H)$.

↓
2, 3, 5 - - - -

[~~5~~, ~~3~~, ~~7~~, ~~10~~]

You
10
5
15

Opp.
7
3
10

[5, 3, 70, 10]

10 5 5 70 57
Our Turn.

10 3 13

~~70~~ 3

F(i, j) → arr[i] → F(i+1, j) → i+1 → F(i+2, j)
→ j → F(i+1, j-1)
F(i, j) → arr[j] → F(i, j-1) → i → F(i+1, j-1)
→ j-1 → F(i, j-2)

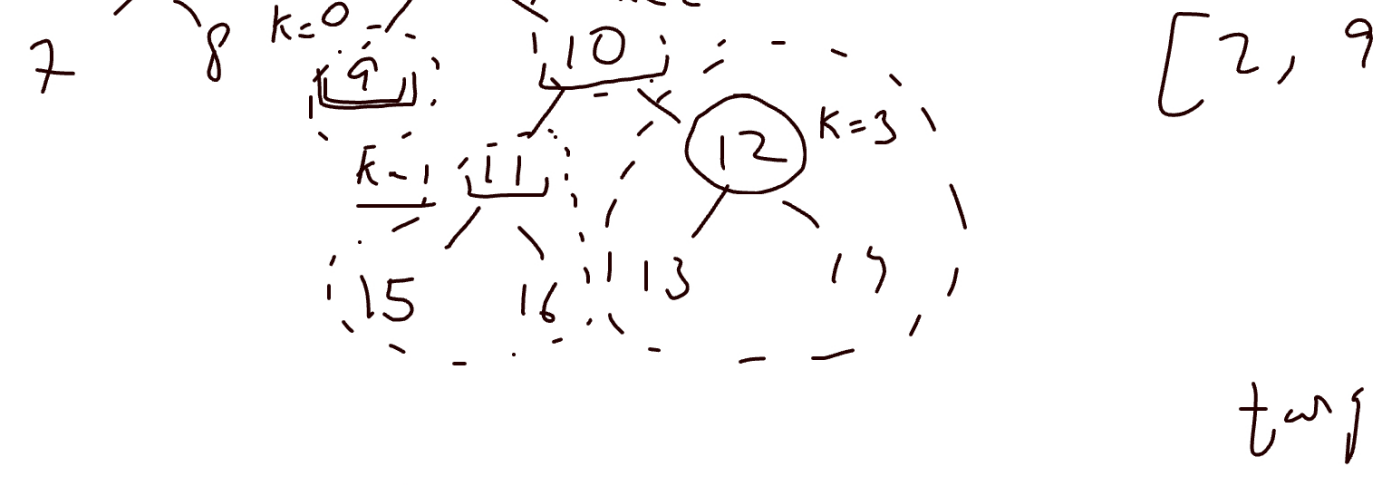
case-1: arr[i] + min(F(i+2, j), F(i+1, j-1)).
case-2: arr[j] + min(F(i+1, j-1), F(i, j-2))

} return max of case-1 & 2.

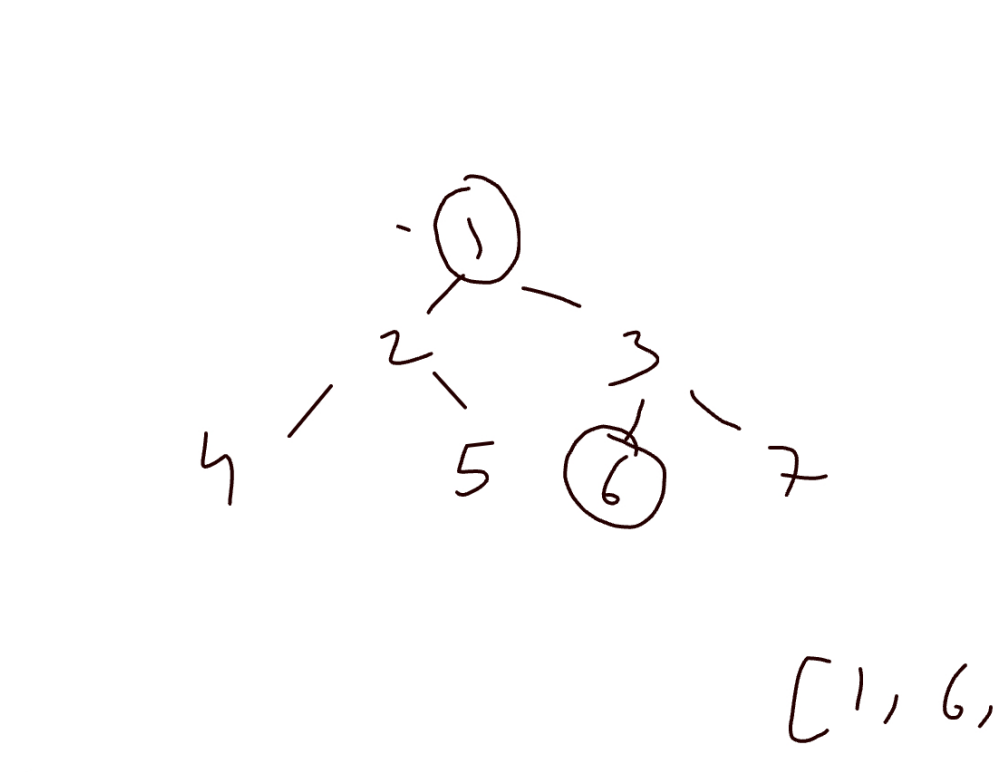
+ + + +

$\overset{i}{-}\ -\ \underset{j-1}{\overset{i}{-}}\ \underset{i+1}{\overset{j}{-}}$

i=0 j=0.


n/2
n/2
(i, j)
(i+2, j)
(i+1, j-1)
(i+1, j-1)
(i, j-2)

H = n/2.
TC = $O(4^{n/2})$


k=0
1
k=-1
2
3
4
5
k=1
7
8
k=0
9
10
k=2
12
k=3
k=-1
11
15
16
13
17

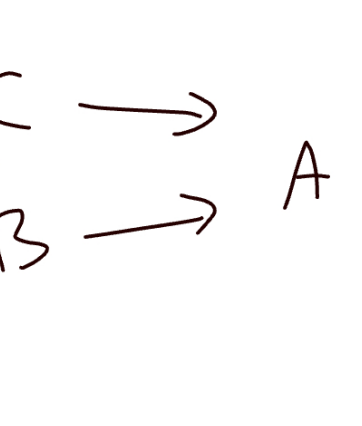
target = 12
k = 3
[2, 9, 15, 16]

[~~2, 9, 15, 16~~]

target = 1
k = 3
[7, 8, 9, 10].

0 1 2 3 4
k=0 k=1 k=2 k=3
path to 12: [1, 2, 5, 10, 12]

n - k - 1



t = 3
k = 1

[1, 6, 7].

A → B, C
B → C, ~~E~~
C → D

D → C → A
↓
B → A

[D, C, B, A]

A / B

C

C → A OR B