Backtracking 0/1 knapsack problem.

P = [11, 21, 31, 33, 43, 53, 55, 65] m = 110

w = [1, 11, 21, 23, 33, 43, 45, 55] n = 8

P/w [11, 1·9, 1·47, 1·43, 1·3, 1·23, 1·22, 1·18]

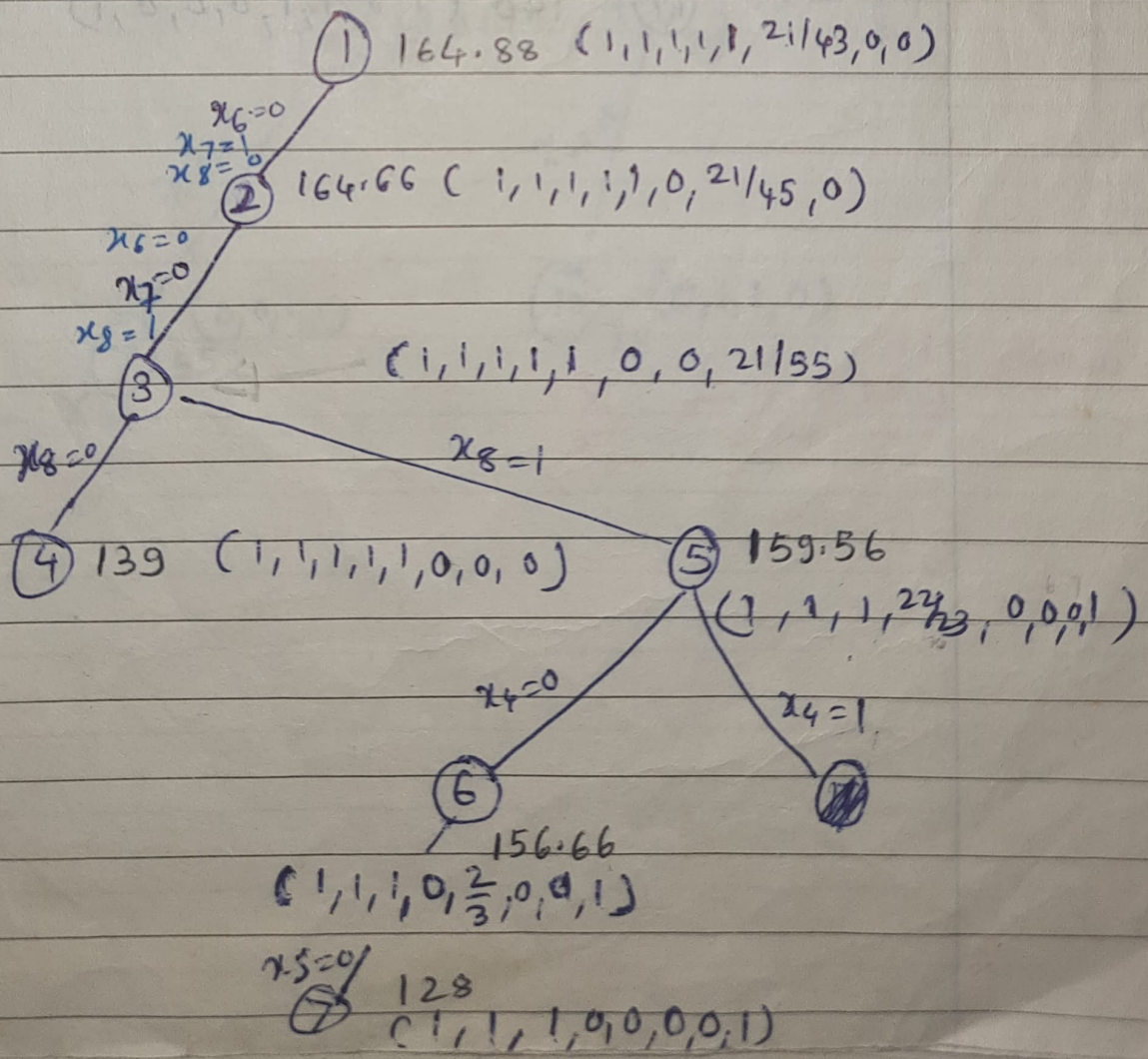
Greedy solution - x = [1, 1, 1, 1, 1, 21/43, 0, 0]

1+11+21 +23+33 = 89 Rem. 21

Profit = 11+21+31+33+43+ 54 × 21/43

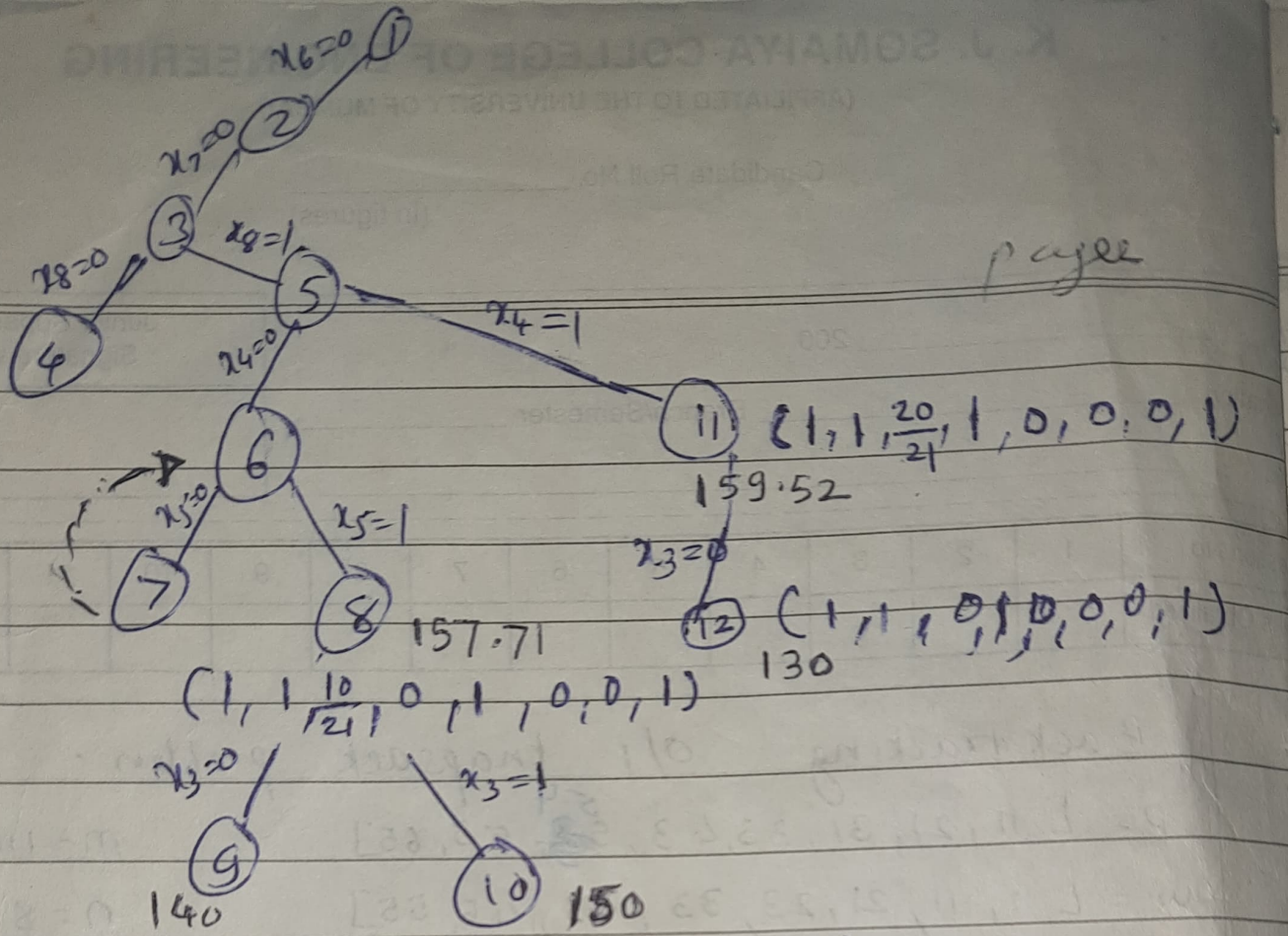
= 142 + 24·71 = 164·88

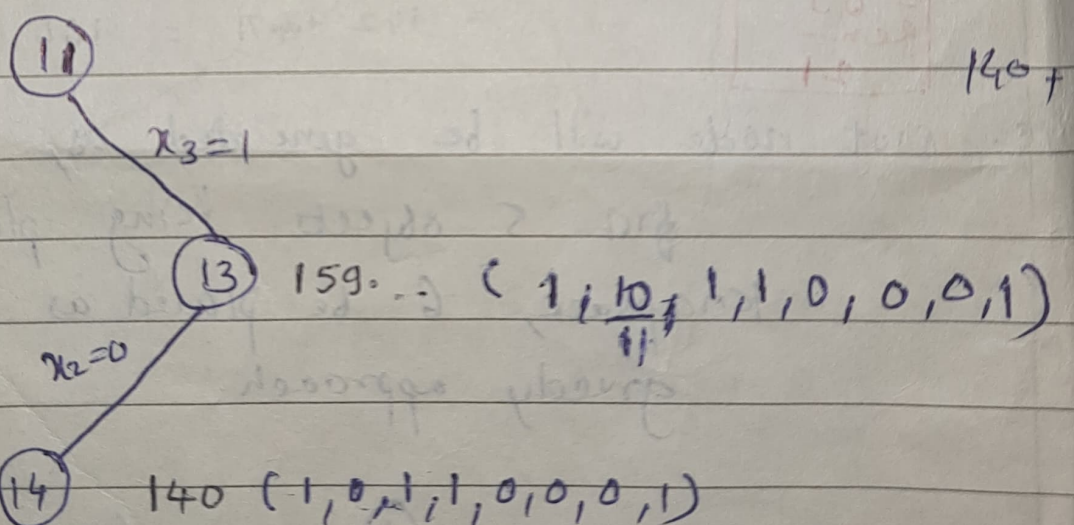
ie root node will be generated as, first 5 objects being placed in knapsack, 6 be placed as 21/43 by greedy approach.



2

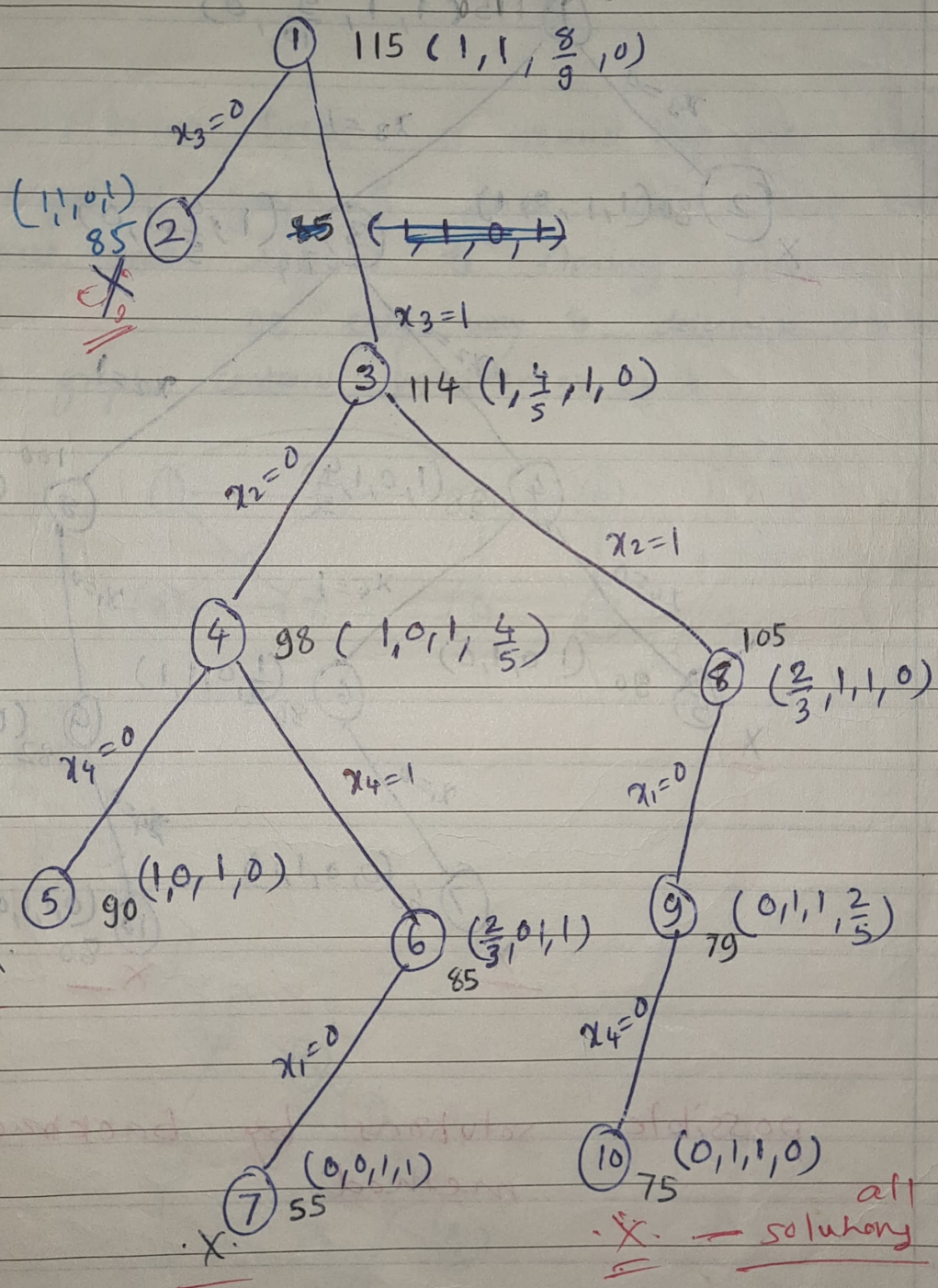
Question No.





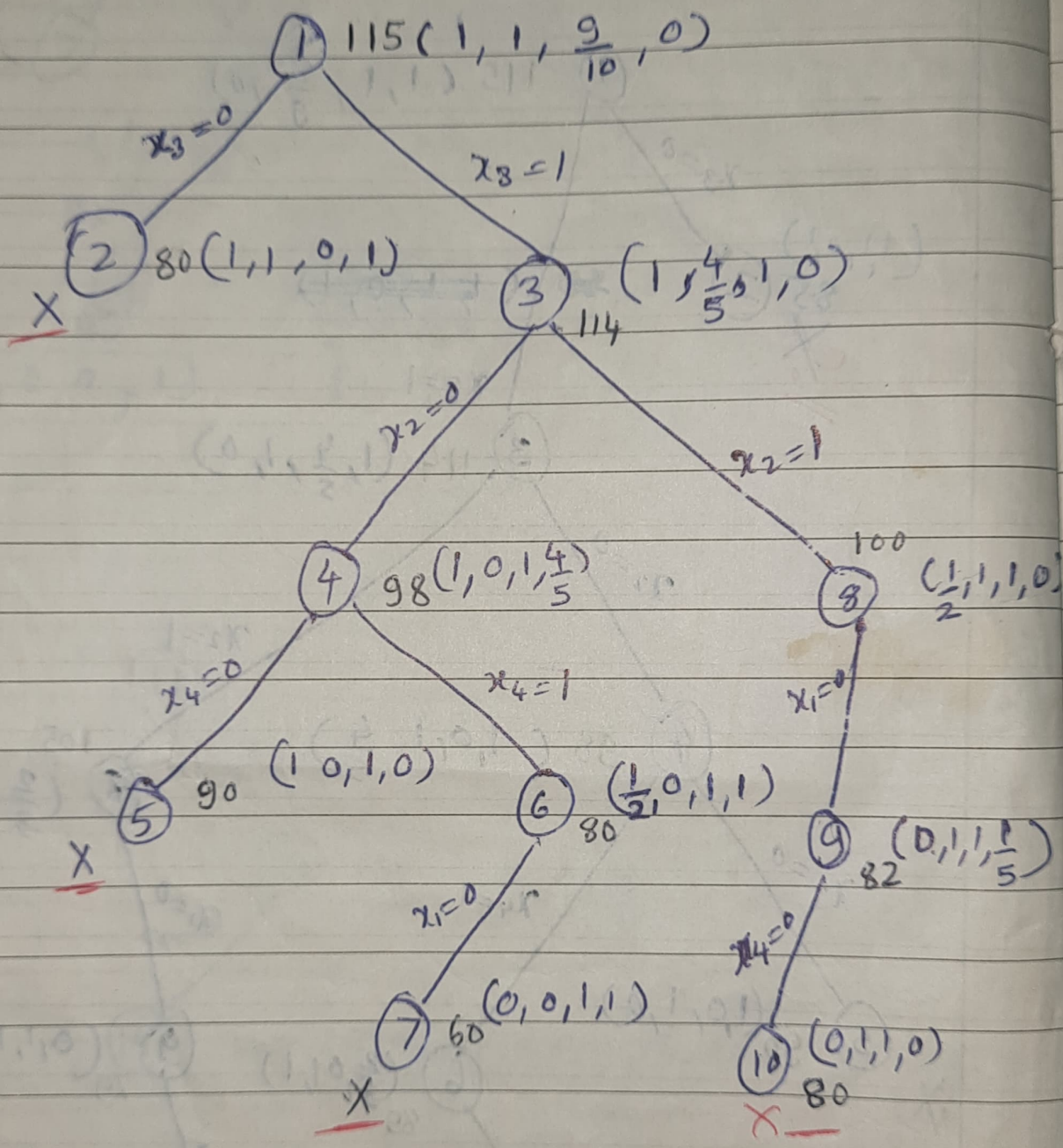
$m = 16$, $n = 4$, $P = [45, 30, 45, 10]$ $\quad \frac{P}{W} = [15, 6, 5, 2]$

$W = [3, 5, 9, 5]$



all possible solutions

n=4, m=16 P = [40, 30, 50, 10] $\frac{P}{W}$ = [20, 6, 5, 2]
w = [2, 5, 10, 5]



possible solutions by backtracking method.

Question No.

m

2] mple:

0/1 knapsack backtracking.

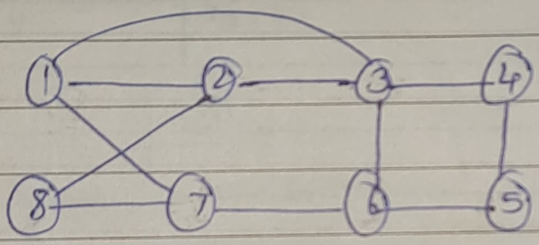
n = 6
m = 15

p = [25 45 12 7 6 10 5]

w = [5 11 3 2 2 7 4]

Hamiltonian Cycles - a round trip path along 'n' edges of graph G that visits every vertex once and returns to starting position.

— no easy way to determine whether a graph contains hamiltonian cycle

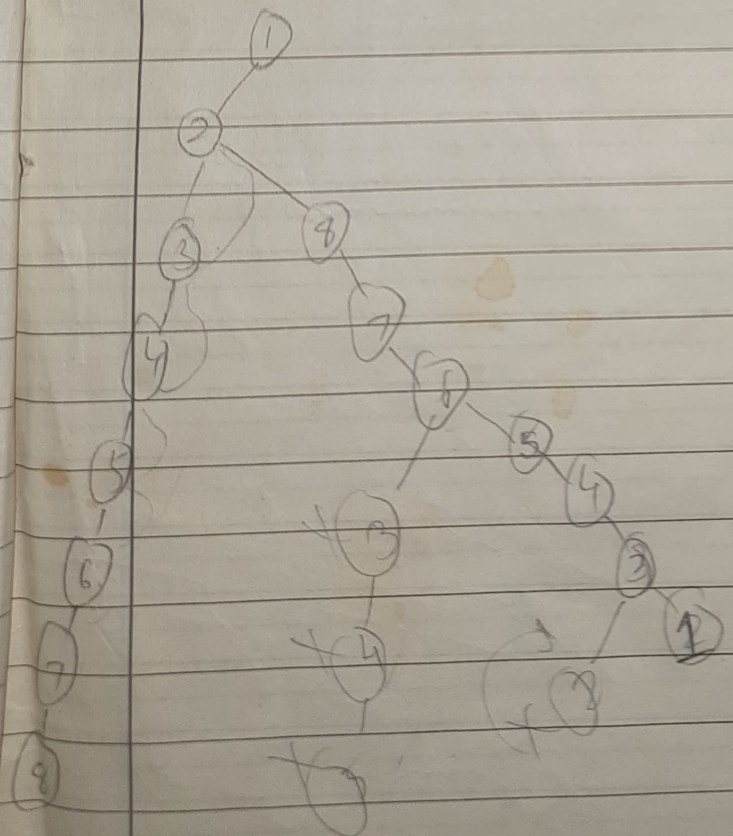


hamiltonian cycle.

1, 2, 8, 7, 6, 5, 4, 3, 1

~~+ 7 6 5 4 3 2~~

1 3 4 5 6 7 8 2 1



0/1 Knapsack problem using Branch & Bound

n=4, Profit: {10, 10, 12, 18}
M=15 Weight: {2, 4, 6, 9}

Initial upper bound = 32 (By adding first 3 elements in bag)

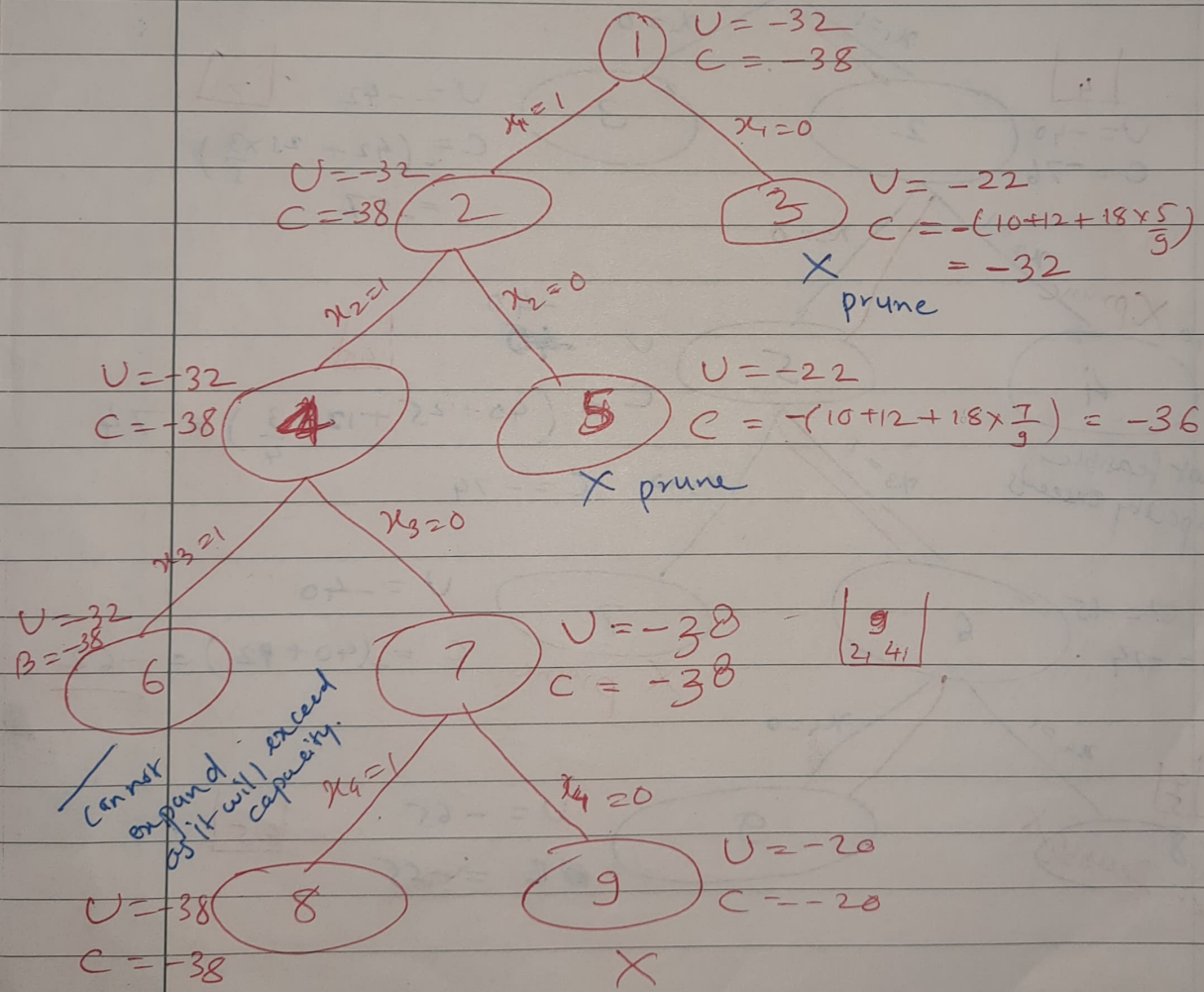
U = 32 | 2,4,6

2,4,6, 31g

Cost function: − 10+10+12+18 x 31g

C = 38

− Negate the values.



Hence soln is {1, 1, 0, 1}

If entire tree is explored complexity is ~~O(2^n)~~ O(2^n).

best case possible if only one path explored, O(n)

n=4
M=10

Profit { 40, 42, 25, 12 }
Weight { 4, 7, 5, 3 }
$\frac{P}{w}$: { 10, 6, 5, 4 }

Initial upper bound U : 40
Cost: $40 + 42 \times \frac{6}{7}$