9/5/23

AA: Tutorial 6

Krishnaraj P.T
PA20. A1

8.1. Branch and Bound Techniques

→ Branch and bound is a problem solving algorithmic technique used in optimization problems. It is often applied to combinatorial optimization problems, where the goal is to find the best solution from a possible set of solutions

→ The key idea behind the branch and bound technique is to divide the problem into smaller subproblems, and systematically explore these branches while keeping track of the best solution found so far.

→ Characteristics:

1. Divide & Conquer
2. Pruning: Branches that are deemed unproductive are pruned or deleted.
3. Optimal solution: Keeping track of the best solution so far.
4. Upper and lower bounds: Bounds are used to determine the feasibility and potential optimality of a solution.

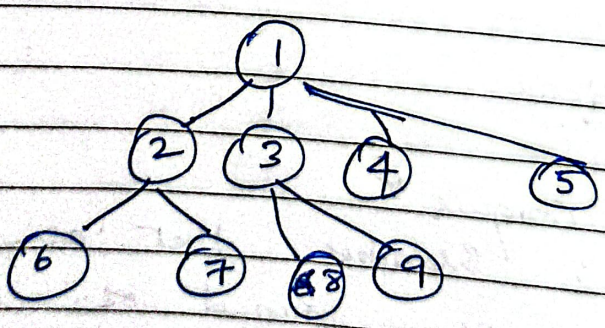
Q. 2. LIFOBB & FIFO BB

Branch and Bound discovers branches within the complete search space by using estimated bounds to limit the no. of possible solutions.

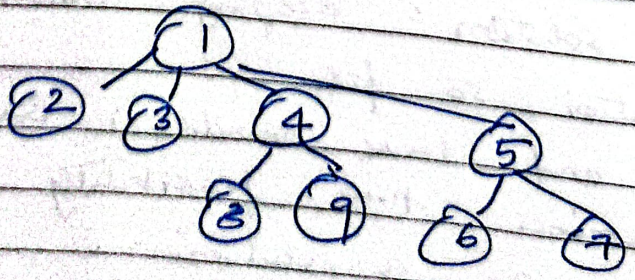
→ FIFO: Always the oldest node in the queue is used to extend the branch. This leads to a breadth first search, where all nodes at a depth d are visited first, before any nodes in depth d+1 are visited.

→ LIFO: Always the youngest node in the queue is used to extend the branch, This leads to a depth first search, where the branch is extended through every first child discovered at a certain depth, until a leaf node is reached.

FIFO



LIFO



① ② ③ ④

Q-3.

weights	4	7	5	3
values	40	42	25	12

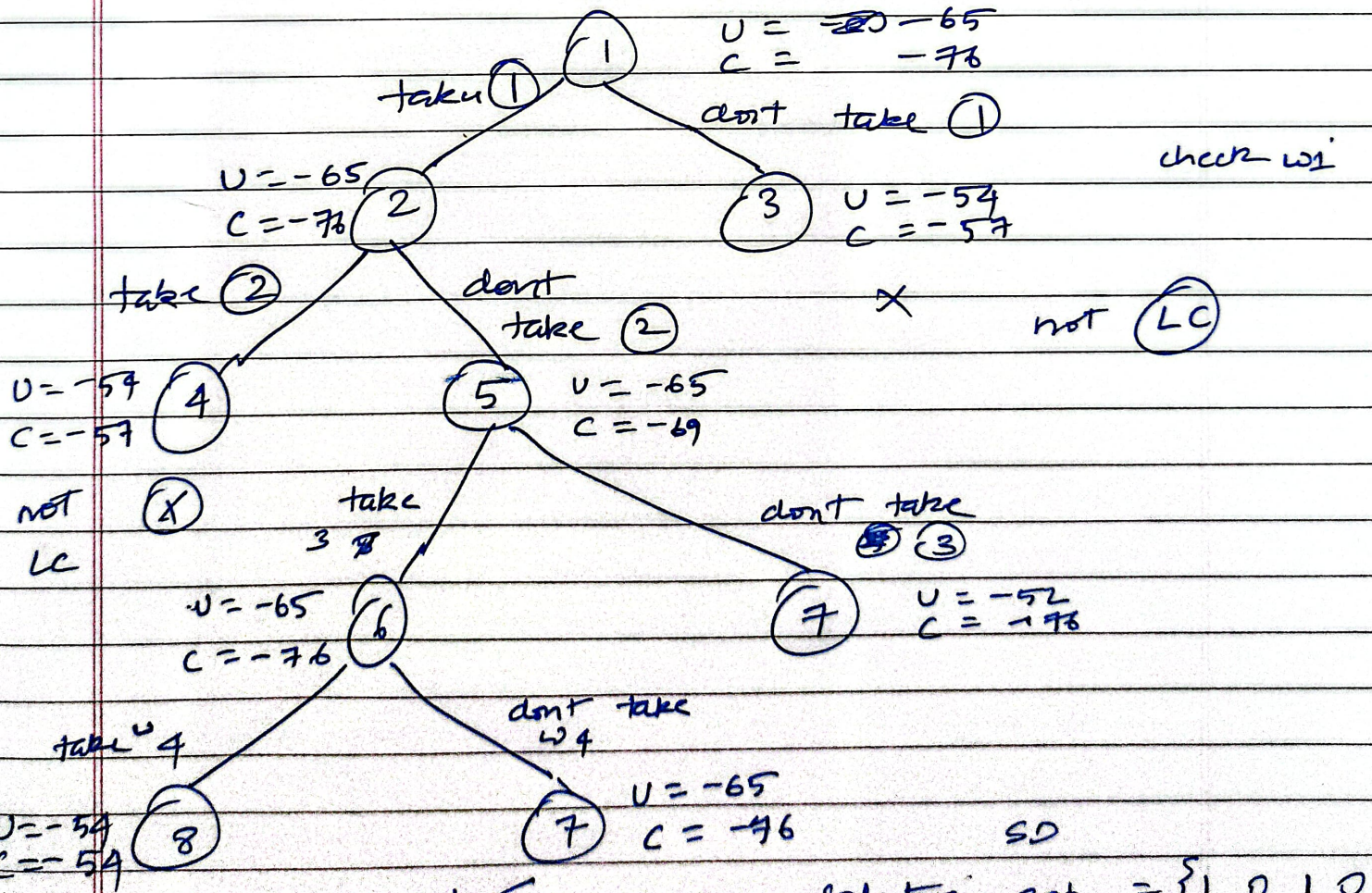
$n = 4$

$\max m = 10$

upper bound $u = \sum_{w=1}^{n} p_i x_i \leq m$

cost $c = \sum p_i x_i$ (with fractions)

so initial $U = -\infty$



so solution set = {1, 0, 1, 0}
or {w1, w3}

so max profit = 65