2020101074 Assignment 2

Naimeesh Narayan Tiwari

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▼ Question 1

First of all let’s see what is the blocks world problem here:

- a set of cubic blocks on a table
- blocks can be stacked
- only one block can fit directly on top of another block
- A robot arm can pick up a block and move
- either on the table or on top of another block
- The arm can only pick up one block at a time (that too the topmost one)

now we need to express in terms of :

1. States:

- ON(A,B) : block A is on block B
- ONTABLE(A): block A is on the table
- CLEAR(A): no block on block A
- HAND(A): the robot is holding A
- EMPTYHAND(): the robot is holding nothing

2. Actions:

- PICK(A): robot picks up block A
- PUSH(A,B): robot puts block A on block B

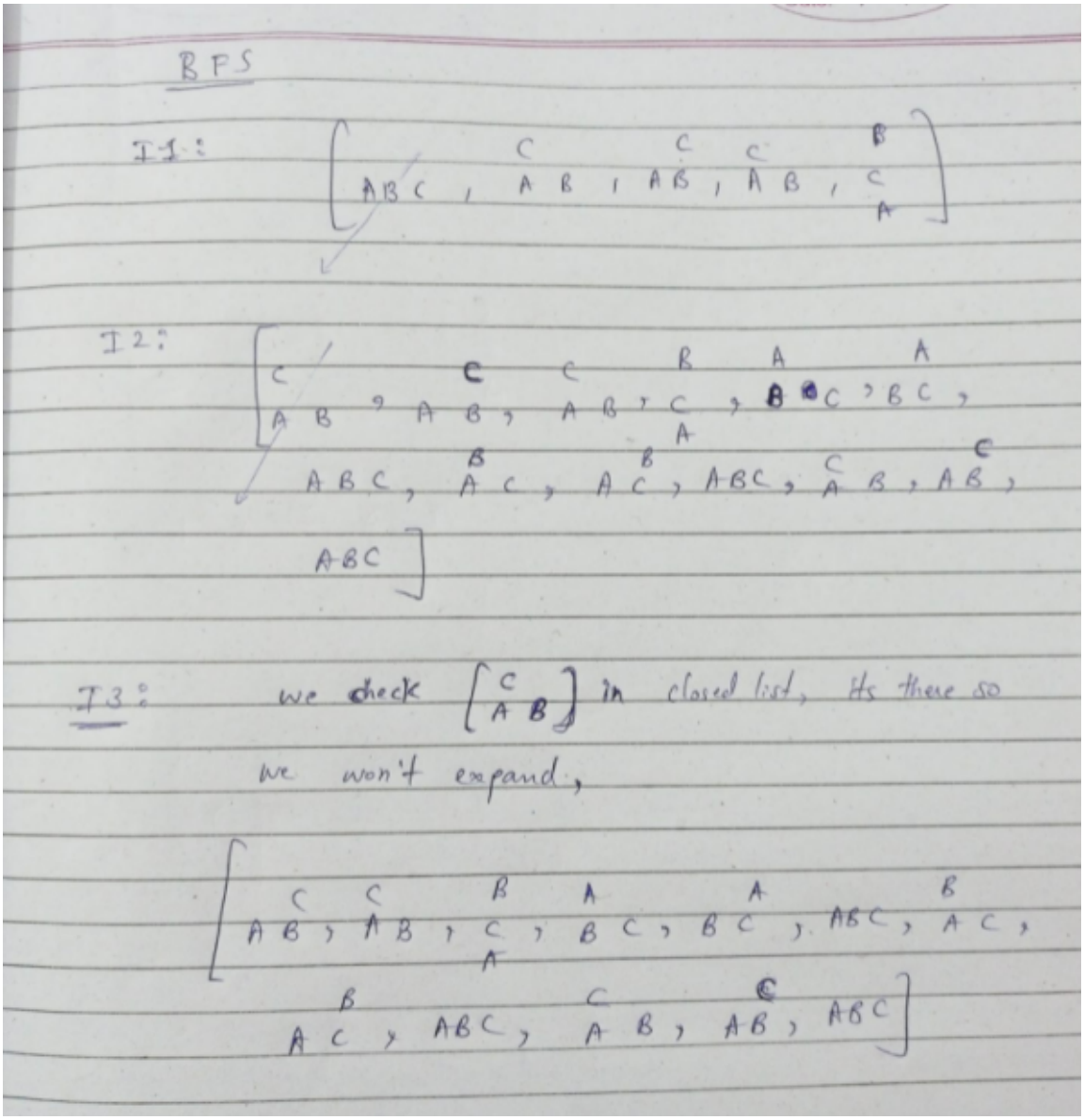
- POP(A): robot picks up block A from top of block B
- DROP(A): robot puts block A on the table

3. Intial State: it is determined by the intial configuration provided
4. Goal test: determined by the final configuration we want
5. Path Cost: The sum of the costs of all the moves/actions is the path cost. If not given we assume it to be 1.

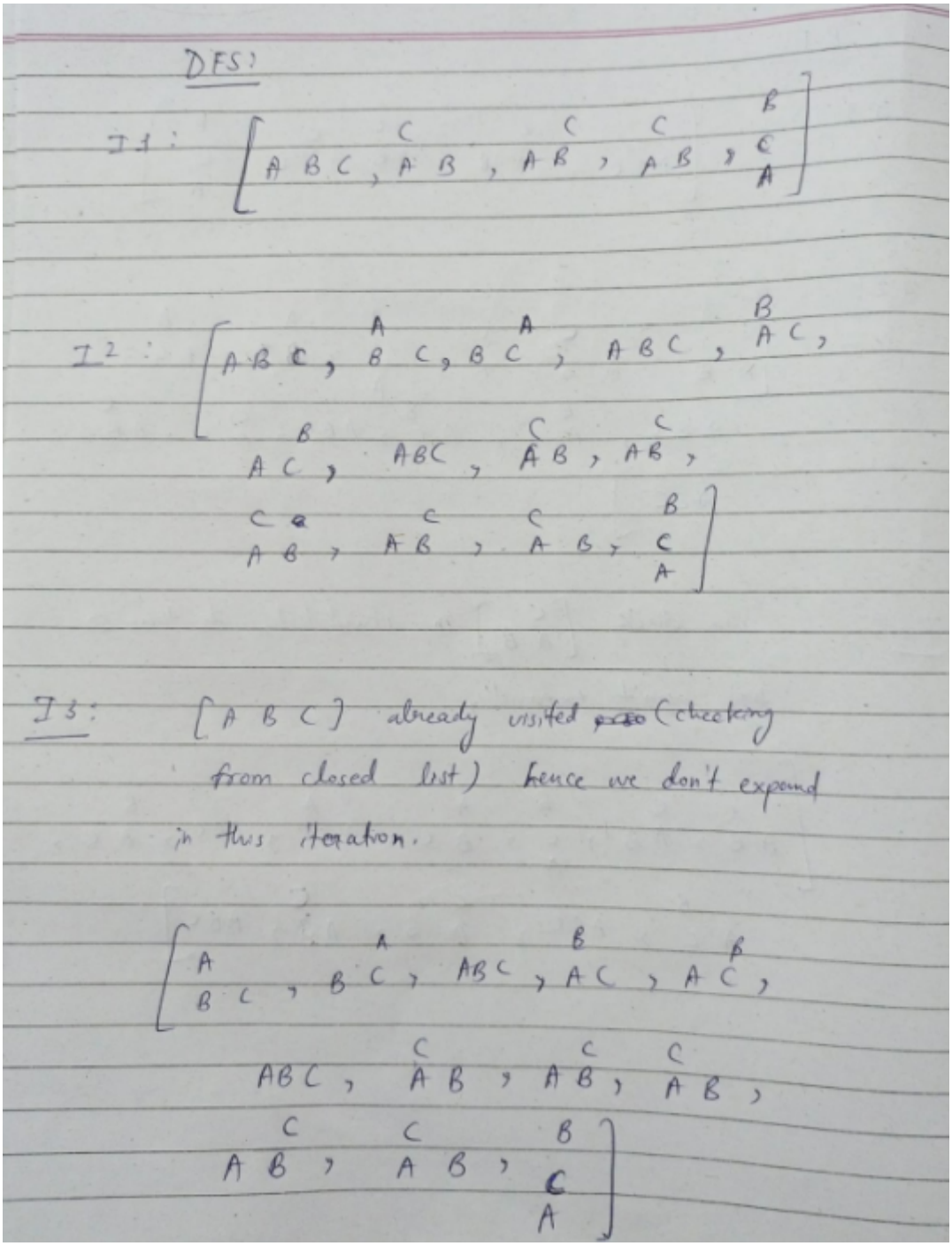
▼ Question 2

Initial state: A and B are on the table and C is on top of A.
Goal state: C is on the table, B is on top of C and A is on top of B.

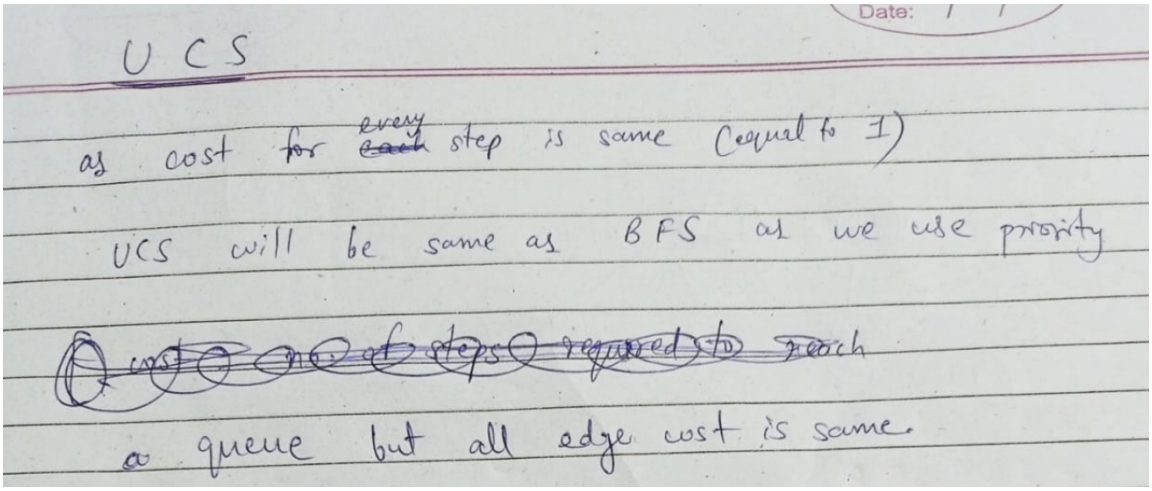
1. BFS


BFS
I1:
I2:
I3: we check in closed list, Its there so we won't expand,

DFS:


DFS:
I1:
I2:
I3: [A B C] already visited (checking from closed list) hence we don't expand in this iteration.

UCS



▼ Question 3

Current State:

[A]

[C B]

Final State:

[A]

[B]

[C]

Heuristic 1: Calculate the number of blocks that are currently not in the correct place. If a block is currently in the robot's arm, it is not counted.

for our case, only C is in the right position hence 2 is added to the Heuristics.

Heuristic 2: Add 2 for every block that is not currently directly on top of the block on which it has to be in the goal state or if there is such a block somewhere below it (in the same pile).

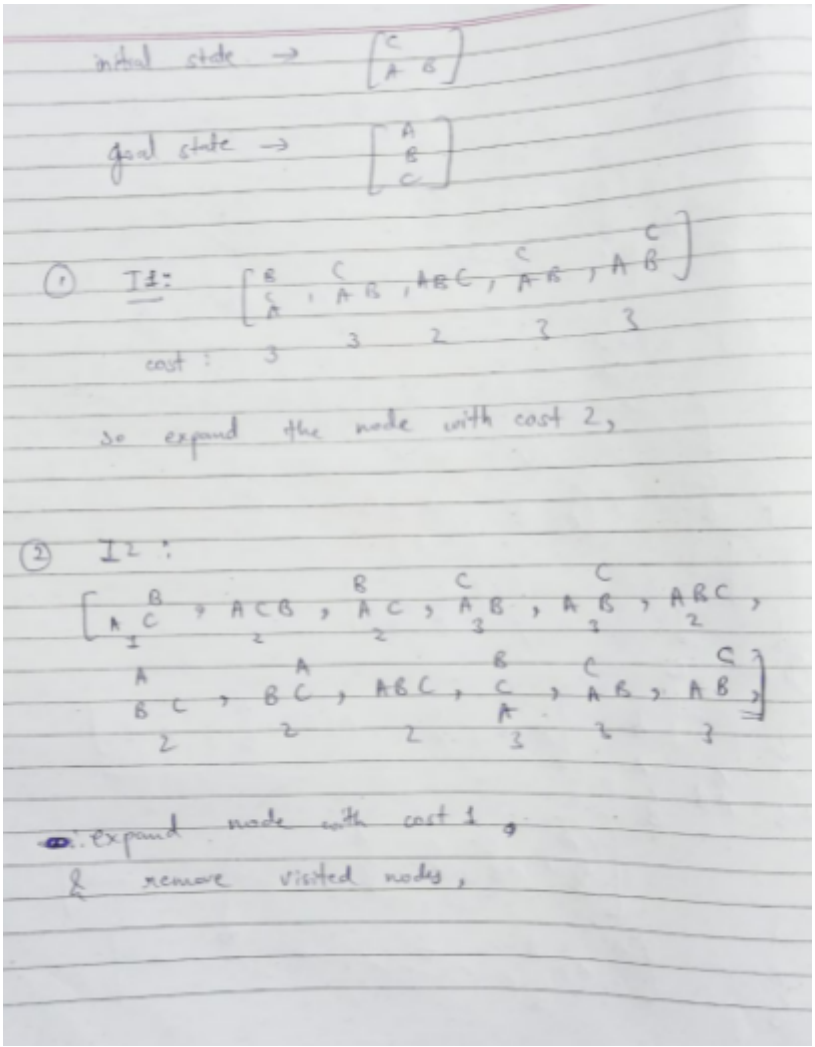
for our case, A should be directly on top of B and B should be directly on top of C

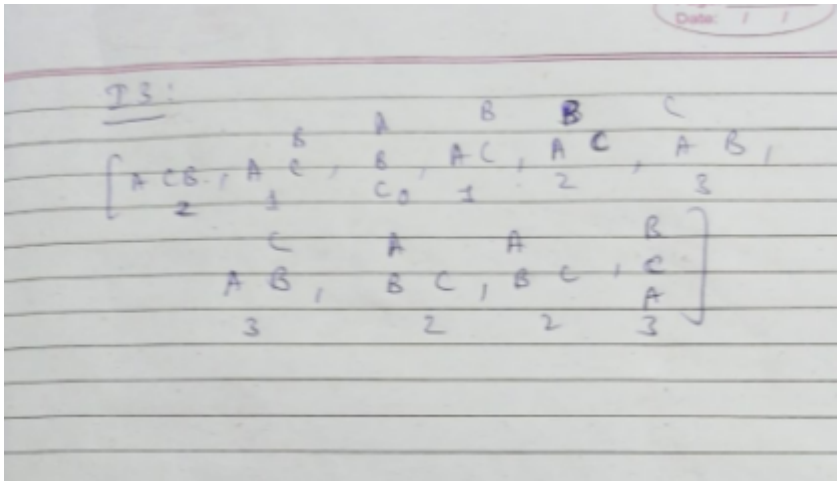
Hence, 4 should be added to the heuristics.

▼ Question 4

We use Heuristic 1 here (it is admissible also)

Applying A* search,




Q3: