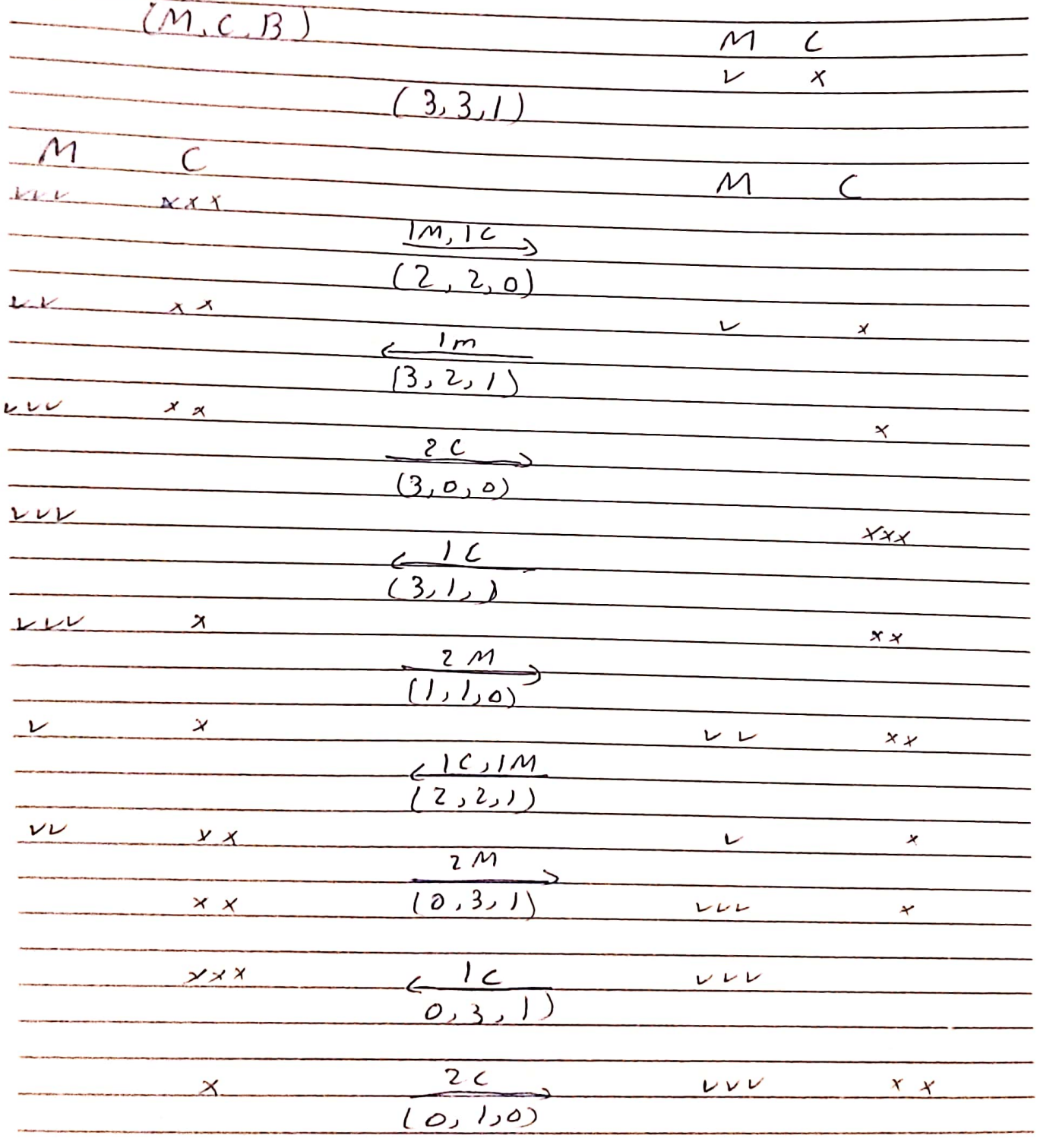
M. Sultan L1F21BSCS0457

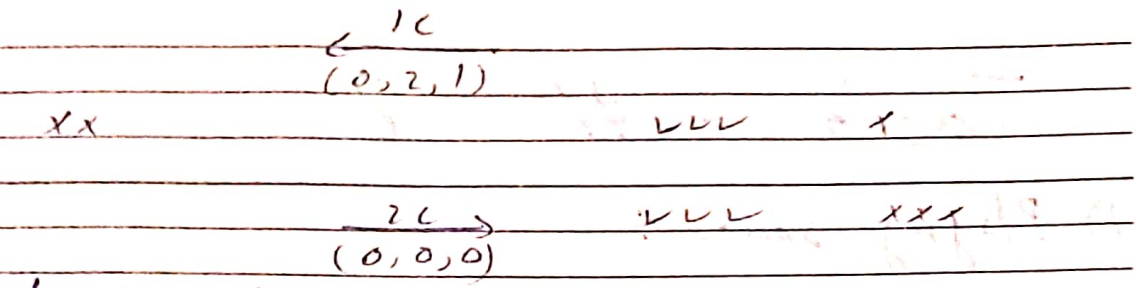
Task # 1

a)

Let M represent missionaries, C represent Cannibals and B represent boats

(M, C, B)





State space:

(3,3,1) → (2,2,0) → (3,2,1) → (3,0,0)
→ (3,1,1) → (1,1,0) → (2,2,1) → (0,2,0)
→ (0,3,1) → (0,1,0) → (0,2,1) → (0,0,0)

b)

Appropriate search algorithm For this problem is Breadth-First Search (BFS) beause BFS guarantes the shortest path. Checking For repeated state is important to avoid infinite loops in certain Search algorithm Repeating might occur, it's not necessary to check repeated stntes. BFS avoid revisting state and exploring each state once and offer shortest Path.

c)

the difficulty in Solving the missionary and carribales problem is that we have to take care that carribals out number the missionaries on either side. the challenging is to plain the boat trip so that missonaries are never overcone by carribals, which requries careful consideration two people can travel on boat and thinking about the safely of missionaries and taking care on both side

Task # 2

1) Playing soccer :

1) Observeable:
we can see players, ground/Field, teamates and opponents.

2) Multi Agents:
Involves multiple players playing

3) Non-Deterministic:
Out comes generates randomly ie (team playing level, weather etc)

4) Sequential:
Continuous game play with different actions.

5) Dynamic:
Continuous change in ball and player position etc.

6) Continuous:
Continuous action and time

2) Exploring the subsurface oceans of Titan :

1) Observeable:
Partialy observable due to limited knowledge of oceans of titan

2) Single Agent:
likely involves a single agent like robot or machine etc.

3) Deterministic:
Actions might be deterministic with in the capabilities of machines /craft/boats.

4) Sequential:
Continous exploration leads it to sequential as we learn about new thing we explore make things from it.

5) Dynamic:
Change in environment as we explore

4) Continous:
Continuous data collection & analysis

3) Shopping for used AI book on Internet:

1) Observeable:
As we can see the book availability and prices.

2) Single Agent:
As only we/buyer is interacting with website.

3) Deterministic:
Out comes determined by choice made (buying book)

4) Sequential:
Steps involved like 1) search, 2) check availibility, 3) select, 4) Pay price, all done in sequence.

5) Dynamic:
Price, Availiable option might change with time.

4) Discrete:
Discrete choices in book selection and purchasing.

4) Playing a tennis match:

1) Observeable:
As we can see field, net, players, equipment

2) Multi agent:
As two players are must be required to play tennis.

3) Non-Deterministic:
it is not predictable who will win it depend upon how the player plays

4) Sequential:
Continuous game play with different actions.

5) Dynamic:
the movement of player, throwing of ball from one point to another

6) Continuous:
Continuous action and time

5) Practicing tennis against the wall:
1) Observable:
Fully observable to a player.
2) Single agent:
only involving a player interaction with wall.
3) Deterministic:
There is no win or lose concept
there Outcomes determined by player action
4) Sequential:
As player hill the ball, it strike with wall and bounce back and repeat
5) static:
the wall does not change it's behaviour during practice.
6) Continuous:
Continuous hitting of ball against the wall for practicing

6) Performing high jump:
1) Observable:
Observable to athlete
2) Single Agent:
Involve single athelete jumping a clitch.
3) Deterministic:
Outcomes determined by physical appearance and technique of athelete
4) Sequential:
continuous action and techniques influcing the jump.
5) Static:
the jump condition remain constant until jump.
6) Continuous:
Continuous physical movement during jump attempt.

7) Knitting a sweater :-

1) Observable:
Observable to person knitting.

2) Single Agent:
Involve single person knitting.

3) Sequential:
Series of knitting sweater.

4) Deterministic:
outcomes are determined by knitting action and pattern.

5) static:
knitting environment remain constant.

6) Continuous:
continuous hand moving during knitting.

8) Bidding an item at an auction:

1) observable:
Bidder can see item and bid amount

2) Multiple agent:
Involves multiple bidders

3) Non-Deterministic:
outcome depend on bidder bid and compitation strategy.

4) Sequential:
Bidding rounds are in sequence

5) Dynamic:
Price and compitators's action changes.

6) Discrete:
Discrete bid increment and decision.

Task # 3

1) Factors:

- Weak Heuristic Funcion Design:
  Is possible that the group created a function that miscalculates the distance to the end state.

Example:
The algorithm can mistakenly estimate son movement if the heuristic function is not suitable.

- Limited Discovery:
  The robot may be alone because the hill climbing algorithm is choosing routes based on greedy rather then considering all options.

Example:
if it just Looks at the immediate neighbors, it can easily get stuck in a local optima.

- Starting Position Relying:
  The puzzle's starting state may have an impact on how well the algorithm performs the algorithm may find it difficult to breath free and discover a global solution if the initial state send it down a path that traps it in a local optima.

2) Modification For Improvement:

- Random Restart:
  Adding a random start technique is one change. the robot might periodically reset itself to a semi-random or random state before running Hill Climbing algorithm once more.

• Modelled annealing:
A Hill climbing variant that permits spoliac "downhill" steps. This accepts fewer promising move a decreasing probability, which helps the algorithm in escaping local optima.

3) Method Used by the second team to create heuristic Functions:

• Heuristic Function that is both admissible and consistent:
It is likely that second team created a Function that Fulfulls the criterin. For the triangle inequality and is both admissible.

• Puzzle structure Consideration:
The heuristic Function may take into account the particular puzzle structure of the eight problem, taking into account variables like the quantity of tiles that are (moving) missing. It may prioritize move that match the characteristic of the puzzle due to this customized techniques.