AI

L1F21BSCS0783
Diyan Saeed

Task 1

a)

1. State Representation :-

Each state can be represented by the current configuration of the track pieces on the boasd

2. Initial State :-

The initial state is the configuration where no pieces are placed on the board.

3. Goal State :-

Goal state is the configuration where all pieces are placed in such a way that there is no overlapping.

Actions :-

Actions are the placement of a track piece in a valid

position and orientation on the board

5- Path cost :-

The cost of a path can be defined as the number of pieces placed.

6- Constraints :-

No overlapping of tracks and no loose ends.

b)

A suitable informed search algorithm can be depth first search due to big state space it would work best, in order to achieve same result as other iterative or breadth first searches in few steps

Task 2

Initial Step and Population

→ chromosomes: Represents routes b/w cities
→ fitness function: Inverse of the total distance of the route (higher fitness for shorter routes)
→ Initial population :- Generate a set of possible routes.

a) Fitness evaluation

Assume 4 cities (A,B,C,D) and distances b/w them :

A-B = 2	B-C = 4
A-C = 5	B-D = 3
A-D = 6	C-D = 2

Routes in initial population

Route 1 : A-B-C-D-A (2+4+2+6 = 14)

Route 2 : A-C-B-D-A (5+4+3+6 = 18)

Route 3 : A-D-B-C-A (6+3+4+5 = 18)

Fitness calculation

Route 1 fitness : 1/14
Route 2 fitness : 1/18
Route 3 fitness : 1/18

Sorted based on fitness

1. Route 1
2. Route 2
3. Route 3

b) Crossover Operations

One-point crossover (middle point) on the fittest two individuals:

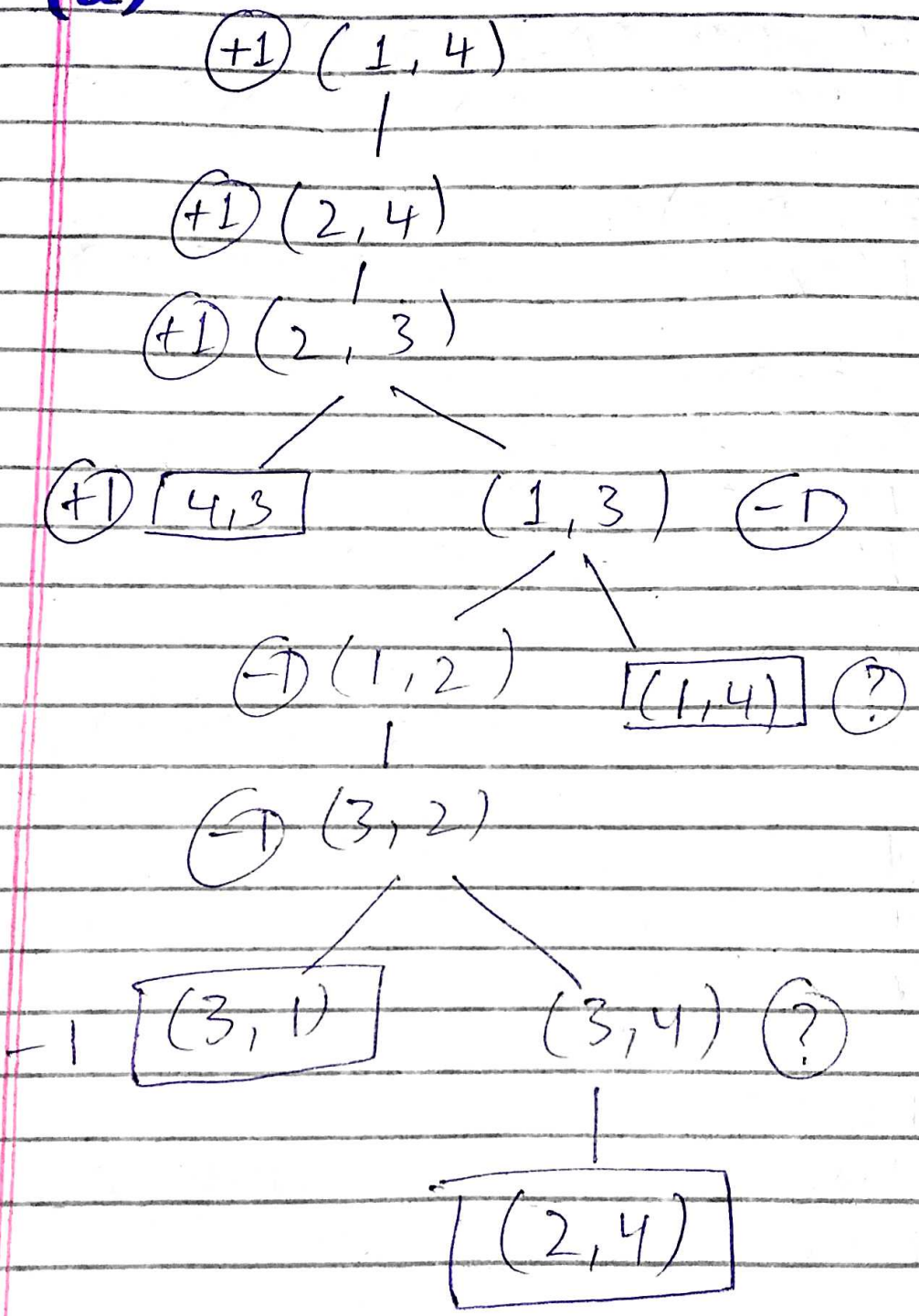
Parent 1 : Route 1 (A-B-C-D-A)
Parent 2 : Route 2 (A-C-B-D-A)
Offspring : A-C-C-D-A and
A-B-B-D-A

c) New population

1. A-C-C-D-A
2. A-B-B-D-A

Task 3

(a)



(b)

Applying Alpha beta pruning

Initial state (A:1, B:4)

- Player A moves to position 2

(A:2, B:4):

- Player B moves to position 3

(A:2, B:3):

- Player A has two options
  - Move to 3 : (A:3, B:3)
  - Move to 1 : (A:1, B:3)

(A:3, B:3)

- Player B moves to position 2

(A:3, B:2)

- Player B moves to position 4
  (A wins) : value = +1.

(A:2, B:1):

- Player B moves to position 1
  (B wins) : value = -1.