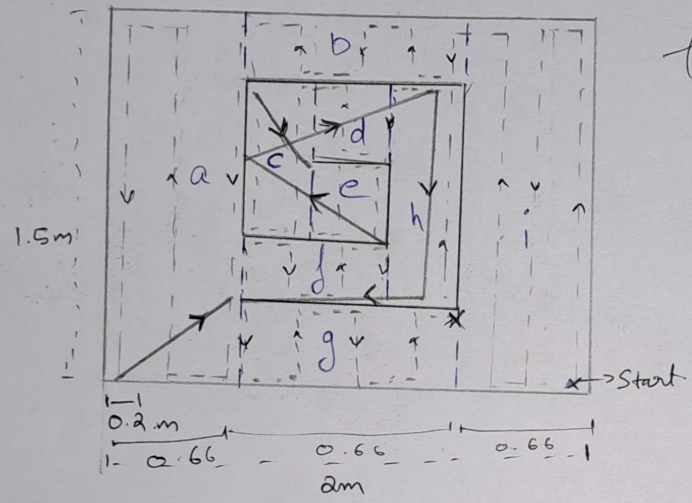
Question 1.

Velocity : 0.2 m/s



Total distance.

Subo (i) = 4.3x1.5m + 3x0.2m.

Subo (b) = 5x0.4m + 4x0.2m.

Subo (a) = 3x1.5 + 2x0.2 + 1x0.77.

Subo (f) = 3x0.15 + 2x0.2

Subo (h) = 0.7x1 + 1x0.2

Subo (d) = 2x0.15 + 1x0.2

Subo (c) = 2x0.7 + 1x0.2 + 1x0.22.

Subo (e) = 2x0.4 + 1x0.24

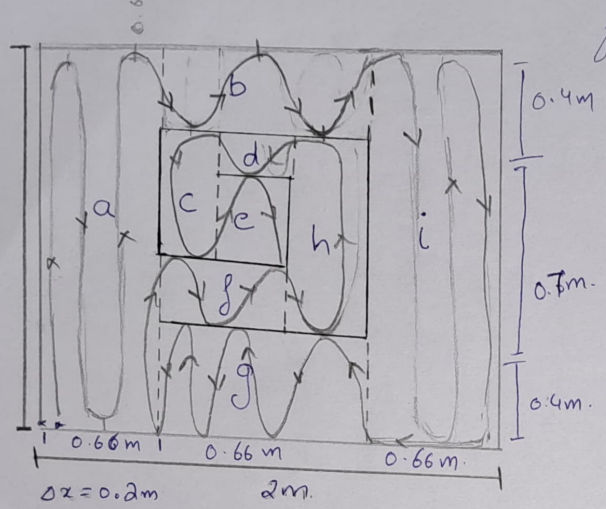
Residual = 0.7 + 0.68 + 0.47 + 0.6

Subo (g) = 4x0.24 + 4x0.2

Total = 20.09 m ≈ 20m

Time taken = $\frac{20}{0.2}$ = 100 seconds.

Question 2



for the velocity of the robot is : 0.2 m/s.

for total distance: (Σ) Distances (Sector A + B + C + D + E + F + G + H + I).

Sector A = 0.66

Distance in Sector A : 4 × 1.5 ×

Sector B = 4 × 0.4

Sector i = 4 × 1.5 + 0.66 × 1

Sector g = 4 × 0.4

Sector f = 2 × 0.15

Sector h = 1 × 0.7

Sector d = 1 × 0.15.

Sector c = 1 × 0.7

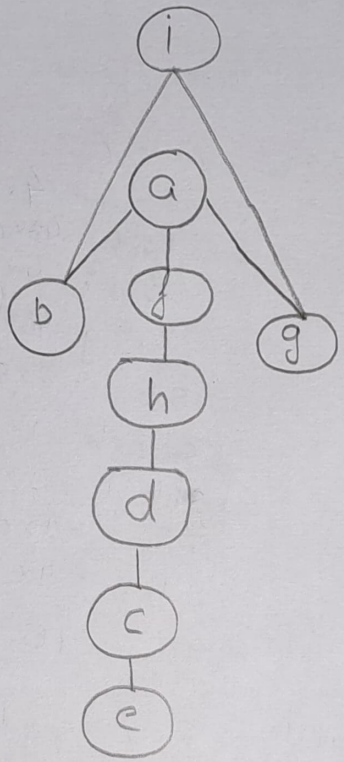
Sector e = 1 × 0.4

Total distance = 18.81 m ≈ 18m

with 0.2 m/s speed.

Total time $T = 18/0.2 = 90$ seconds

Rebb graph



Question 6

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* The robots has LiDAR sensors which gives the distance measurements of objects from the robot.

* the algorithm of the pursuer has the obstacle avoidance capability using the data from LiDAR hence we can ensure that there is no collision between the pursuers.

* the ~~const~~ controls for motion while obstacle detection is the opposite for each robot. the pursuer-1 moves left while pursuer-2 moves right. ~~bound~~

* ~~the~~ When a lidar range reading comes below a threshold (0.2m), the pursuers ~~get into obstacle~~ using the differential drive, steers away from the obstacle hence avoiding collision.

Question 5

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* with 2-pursuers as shown in the simulation, at most instances, the time to capture the evader is less than the one with single pursuer as the probability of capturing the evader has increased with additional sensing area provided by the second pursuer.

* It is not always true that the total time will be lower as it could be same at instances where the pursuer and evader are starting at the same spawn point, or the spawn points are not covered by any obstacles.