Task 1

- Task:
    1. We have to take the car out of a parking lot without any obstacles.
- States and Actions:
    1. A state has 4 variables, x,y, speed and direction
    2. Total 15 actions are possible, 5 corresponds to acceleration and 3 corresponds to steering direction.
- Optimal Policy : for a given state, the next state is decided as follows
    1. Find the required angle between given position and entrance
    2. Now check the heading angle, we have to turn our steer considering heading angle and required angle.
    3. If the difference between angles is less than 3 , we can give full acceleration and move the steer with zero degrees.
    4. In all other cases , we need to choose the steer such that we get close to the required angle.
    5. And acceleration is given only if velocity is 0 or the difference between angles is less than 3.

Task 2

- Task:
    1. We have to take the car out of the parking lot without running into obstacles.

- States and Actions:
  1. A state has 4 variables, x,y, speed and direction
  2. Total 15 actions are possible, 5 corresponds to accelerations and 3 corresponds to steering direction.
- Optimal Policy: for a given state, the next state is decided as follows
  1. Get the values -y1,+y2 for which there are no blocks in the region -y1 to +y2 for all x
  2. Now if the car lies in this region , use the next_state of Task1.
  3. Else if the car is in +y region, if there is no block between this position and x-axis, aim to the x-axis keeping the x same as state and y as zero, now this our new required angle , keeping this as our required angle apply the rules of task1 to obtain next state. Same applies to the case where the car is in -y region. This is the same as moving in a vertical direction.
  4. Now if there is a block between the car and x-axis, we can make the car move right until it goes to a position same as above , we can calculate the required angle keeping the y same as state and change x to x' such that there is no block between (x',y) and (x',0) and apply rules similar to task1 and return the next state. This is the same as moving in a horizontal direction.
  5. Since there is a chance of running into an obstacle if the car is close enough, I am giving negative acceleration to the car until it gets in the same direction as the required angle, This way we can be more careful in the corner cases.