Kanishk Singh- SE21UCAM005 (CAM)

Assignment 7- Island Survival

Functions Used:

1. Starting_point: Initialises an island of size n with a person on a random location and returns the island and persons coordinates

```
def starting_point(n):

    xcor=random.randint(1,n-1)
    ycor=random.randint(1,n-1)
    return xcor,ycor
```

2. Walking: Simulates the walking of the person and returns if they died or survived:

```
def walking(steps, n):
    direction=random.choice(["north","east","south","west"])
    pxcor,pycor= starting_point(n)

    for _ in range(steps):

        if direction == "north":
            pycor -= 1
        elif direction == "east":
            pxcor += 1
        elif direction == "south":
            pycor += 1
        elif direction == "west":
            pxcor -= 1

        if pxcor<0 or pxcor>=n or pycor<0 or pycor>=n:
            return 0
    return 1
```

3. Survival_rate: simulates a given number of walks to find the probability of survival, Uses Monte-carlo approach to return the probability

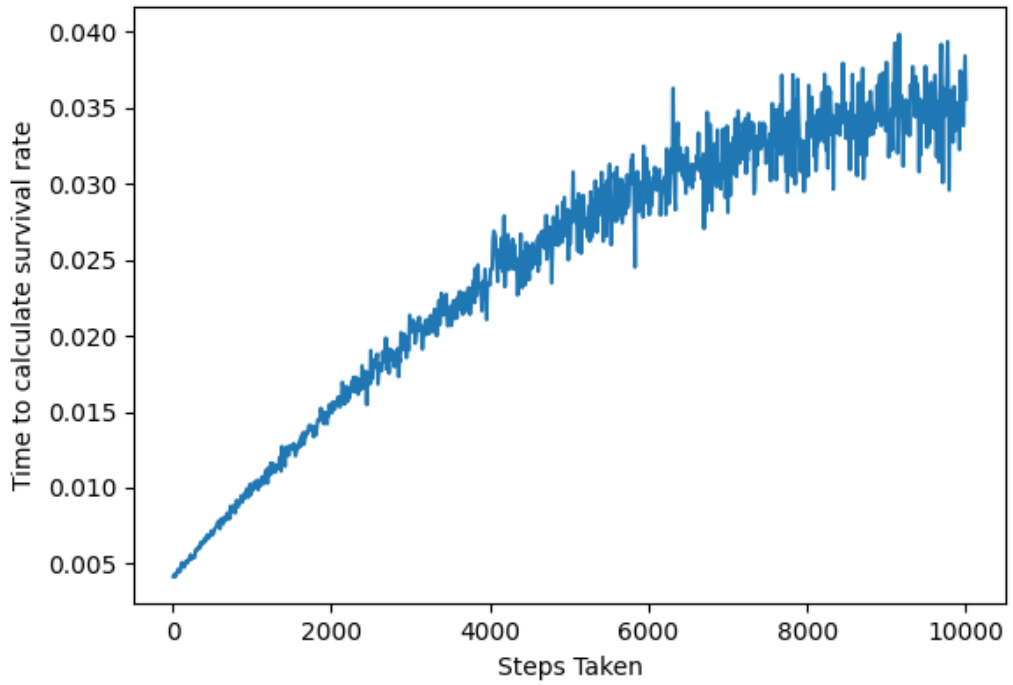
```
def survival_rate(N, steps, simnumber):
    alivecount=0

    for _ in range(simnumber):
        result=walking(steps,N)
        alivecount += result

    probability= (alivecount/simnumber)
    return probability w
```

Program Desc:

1. We are taking a fixed island size and we're increasing the number of steps and finding probability for each step size.
2. For a particular number of steps we are running several simulations 100 in this case to calculate the survival probability.
3. We start with a certain number of steps and then increment it, in this case starting with 5 and incrementing by 5 till the matrix size.

Output analysis: If we run it for 1000 different step sizes we can see that the probability of survival decreases, the first derivative is decreasing.

Graph: Here we can see we get a logarithmic graph



Conclusion: This function has a sub linear convergence because as the number of steps increases the person dies and the simulation runs for some N^x times where x<1 and N is size of matrix