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Program Structures & Algorithms
Fall 2021
Assignment No. 1

Tasks performed in the Assignment:

1. Computed the distance from the origin to the current position based on the number of steps he has taken.
2. Deduced the relation between the number of steps and distance from the origin.

Relationship Conclusion:

After passing multiple values of number of steps(n) {36,49,64,81,100,121} as an argument and running each step value for 10 times, I could able to conclude that the Euclidean distance (d) of the man from the lamp-post is approximately equal to the square root of the number of steps (n).

d ≈ sqrt(n)

d is distance from lamppost to final point

n is the number of steps taken by drunk man.

Evidence to support the conclusion:

Console output based on the input arguments:

36 steps: 5.848110512598427 over 10 experiments

49 steps: 7.348269760799354 over 10 experiments

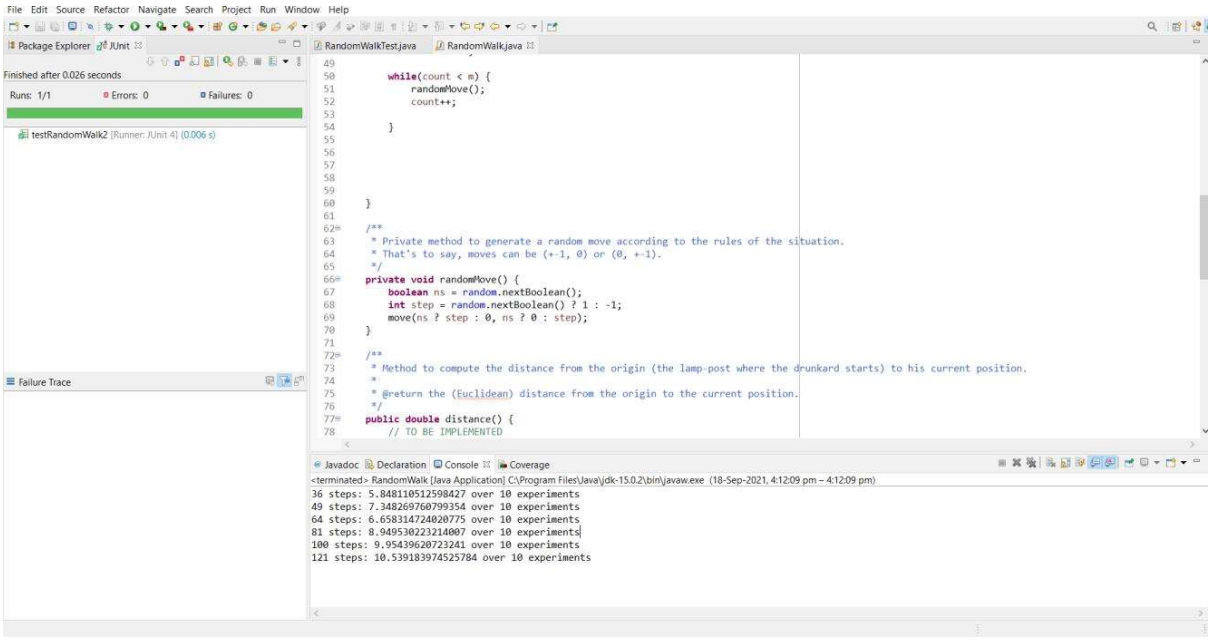
64 steps: 6.658314724020775 over 10 experiments

81 steps: 8.949530223214007 over 10 experiments

100 steps: 9.95439620723241 over 10 experiments

121 steps: 10.539183974525784 over 10 experiments

1. Output (Snapshot of Code output in the terminal)

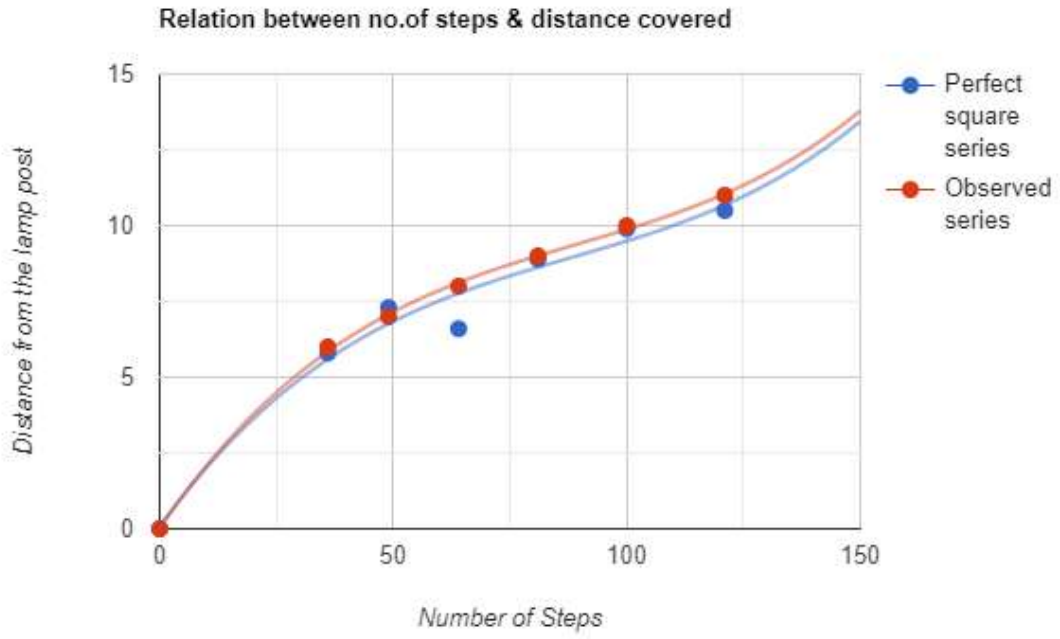


2. Tabular Representation:

No of steps (n)	distance (d) = Sqrt(n)	Observed Mean distance
36	6	5.8
49	7	7.3
64	8	6.6
81	9	8.9
100	10	9.9
121	11	10.5

3. Graphical Representation

Perfect square series and observed series graphs are plotted to establish closeness between distance and number of steps.



Unit tests result Snapshot: