

Assignment 1: Random Walk

1. Task: Imagine a drunken man who, starting out leaning against a lamp post in the middle of an open space, takes a series of steps of the same length: 1 meter. The direction of these steps is randomly chosen from North, South, East or West. After n steps, how far (d), generally speaking, is the man from the lamp post? Note that d is the Euclidean distance of the man from the lamp-post.

2. Conclusion: Distance from lamp (d) is approximately the square root of No. of Steps (n)

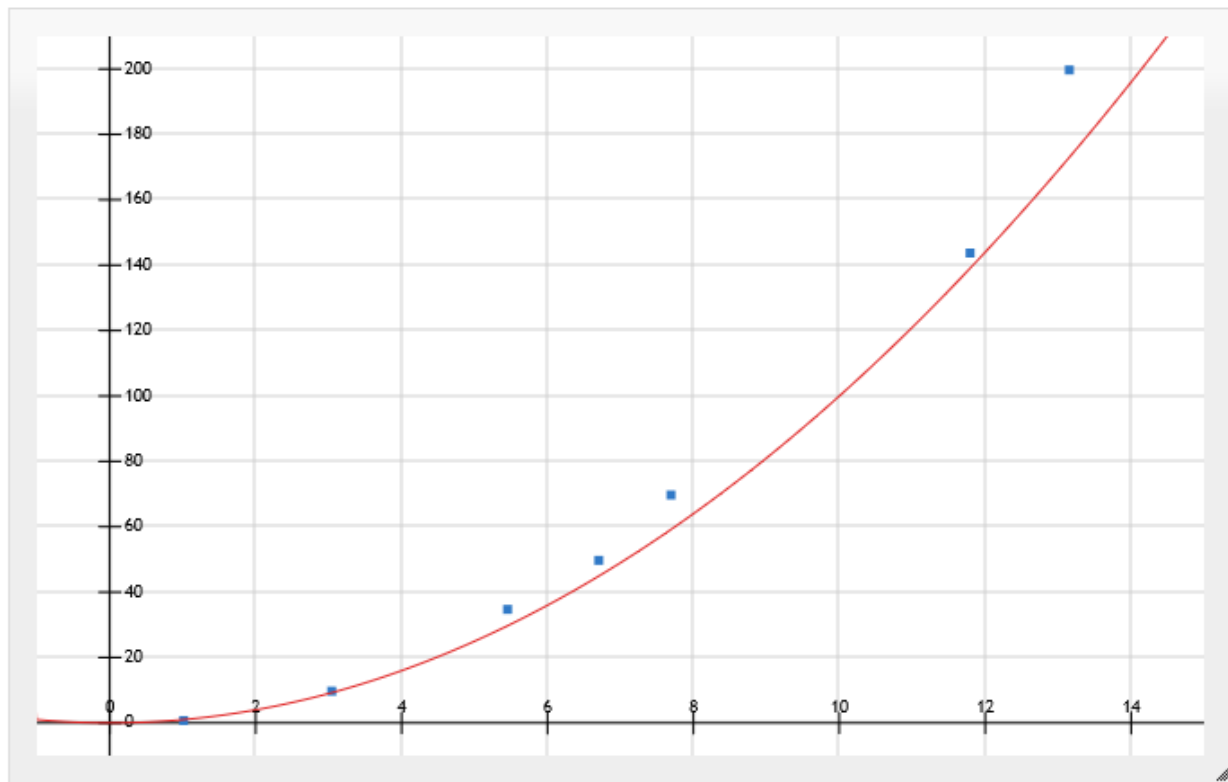
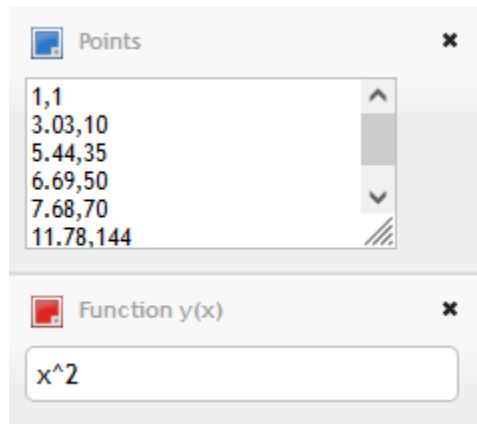
$$d = \sqrt{n}$$

3. Evidence: Here we plot out values in a graph. Where x-axis is distance from lamp and y-axis is number of steps. Along with function $y(x) = x^2$

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1 steps: 1.0 over 30 experiments
10 steps: 3.037537845960577 over 30 experiments
35 steps: 5.442936741126953 over 30 experiments
50 steps: 6.6987181541520355 over 30 experiments
70 steps: 7.686930528407713 over 30 experiments
144 steps: 11.785536595227773 over 30 experiments
200 steps: 13.142918988155289 over 30 experiments

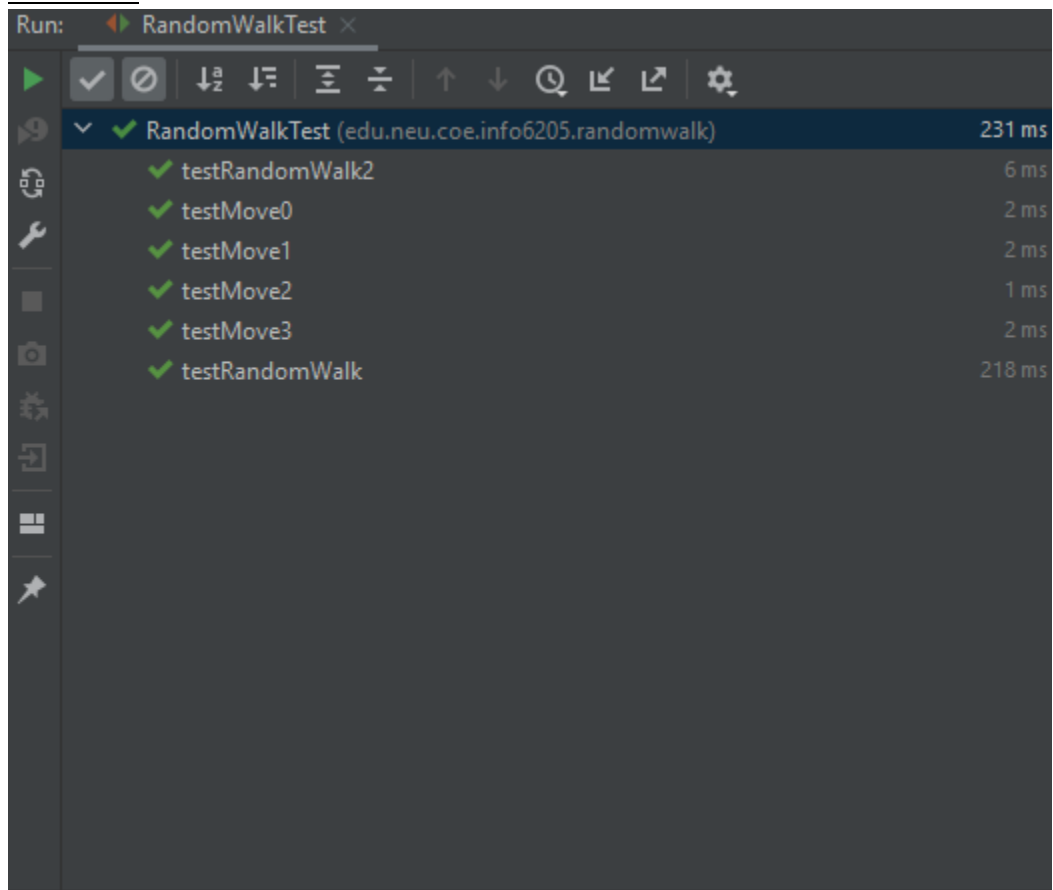
Process finished with exit code 0
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No. of Steps (n)	Distance from lamp (d)
1	1
10	3.03
35	5.44
50	6.69
70	7.68
144	11.78



4. **Code:** Attached in zipped folder.

5. Unit Tests:



The screenshot shows the 'Run' window of an IDE, specifically for a test class named 'RandomWalkTest'. The window has a title bar 'Run: RandomWalkTest' and a toolbar with icons for running, pausing, and other test-related actions. The test results are displayed in a tree view on the left and a table on the right. The table lists the test methods and their execution times.

Test Method	Execution Time
RandomWalkTest (edu.neu.coe.info6205.randomwalk)	231 ms
testRandomWalk2	6 ms
testMove0	2 ms
testMove1	2 ms
testMove2	1 ms
testMove3	2 ms
testRandomWalk	218 ms