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Program Structures & Algorithms INFO6205

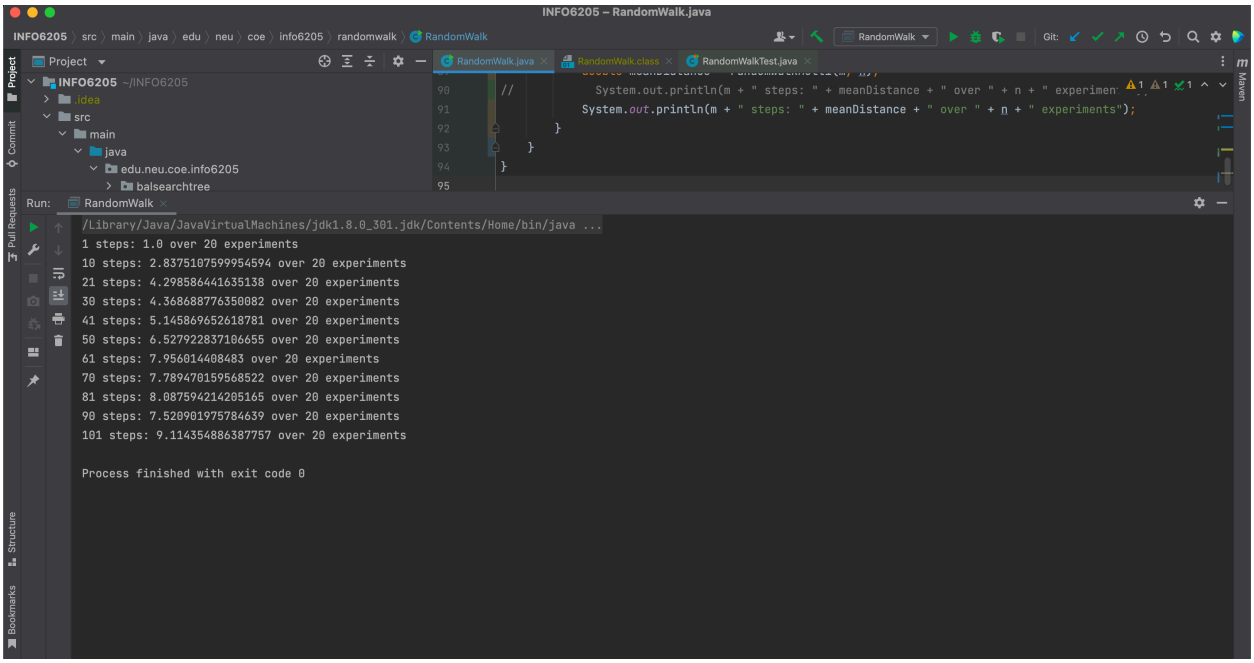
Assignment 1

Task Performed :

Following is the task performed or functions called in the assignment

- Implemented move(), randomWalk(), distance() function from the main function in order to generate the necessary output for the conclusion
- Modified the main function to get the results for the plots to implement
- Established the relationship between d and n

Output ScreenShot :



After 11 different steps, every 20 experiments, the mean distance is printed above from the main function. Where process exit code states program ran successfully hence not adding that screenshot

Relationship Conclusion :

$d=\sqrt{n}$

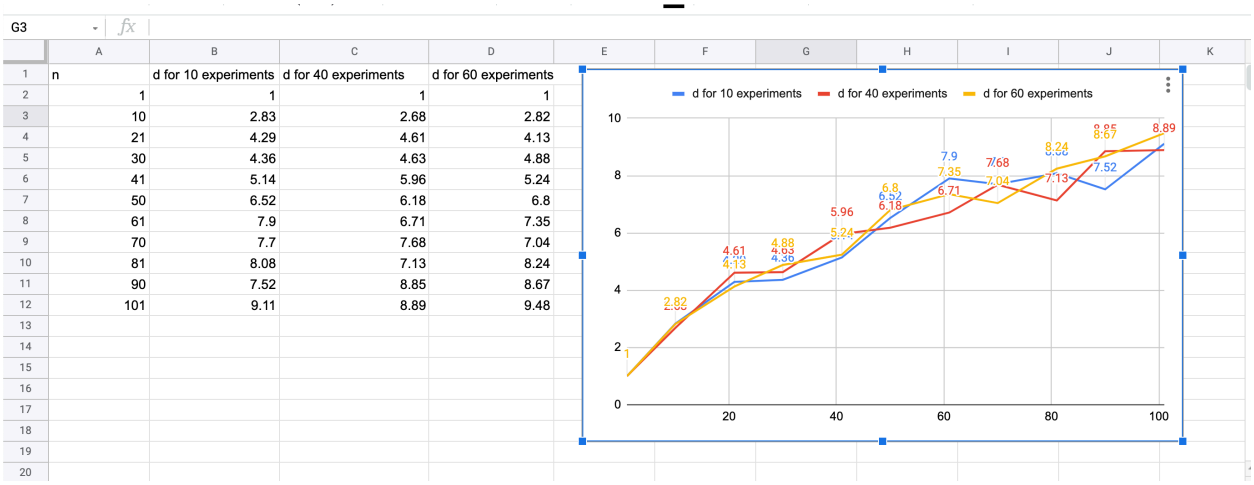
My Take :

Although this relationship is true, it is actually the overall combinations of or the combined result of d is directly proportional to n and d is the hypotenuse distance from n

Another way of my note, $d = X^2 + Y^2$

But since x = y = similar, one equal step, (does not change with direction) comes as $d=\sqrt{n}$

Evidence and Plots :



n	d for 10 experiments	d for 40 experiments	d for 60 experiments
1	1	1	1
10	2.83	2.68	2.82
21	4.29	4.61	4.13
30	4.36	4.63	4.88
41	5.14	5.96	5.24
50	6.52	6.18	6.8
61	7.9	6.71	7.35
70	7.7	7.68	7.04
81	8.08	7.13	8.24
90	7.52	8.85	8.67
101	9.11	8.89	9.48

Here, multiple experiments are being considered for more accuracy. We can that for other experiments the output is almost similar which proves the logic validity

From the trendline in the left graph,

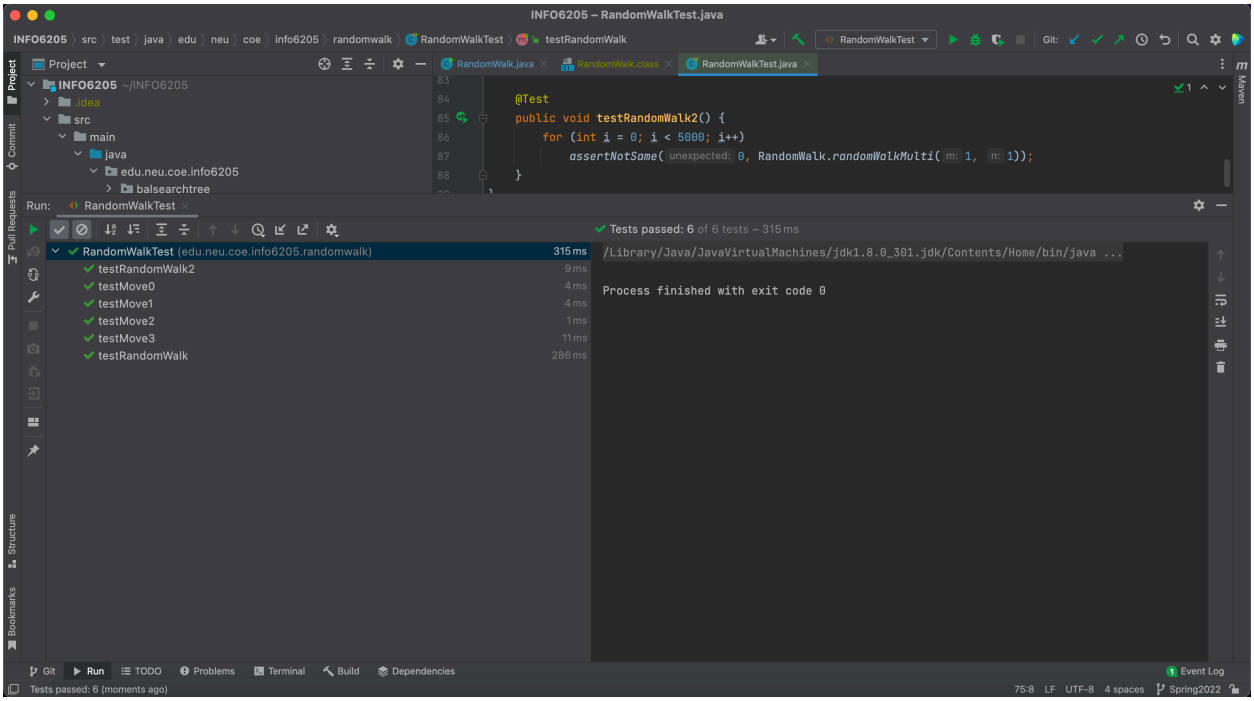
y = 7.9x – 7.35x

which is similar to
y = x (approx 8) ,
y (60) = x (8)

relationship quotient : $n = d^2$

Thus, we can **Conclude** : $d = \sqrt{n}$.

Unit Test Results :



This screen shot shows that all the unit test ran properly with expected output for all the function in the program flow