Program Structures and Algorithms
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**Task: Assignment 1 (Random Walk)**

**Relationship Conclusion:**

The relationship between the Euclidean distance (d) and the number of steps (m) in the random walk experiment can be analyzed based on the behavior of the random walk process. In this specific implementation, the drunkard takes a series of steps of the same length (1 meter), and the direction of each step is randomly chosen from North, South, East, or West.

As the number of steps increases, the drunkard's position becomes less predictable, and the Euclidean distance from the starting point tends to increase. The relationship between d and m is generally characterized by an increase in d with an increase in the number of steps.

However, the exact nature of the relationship can vary due to the stochastic (randomized) nature of the experiment. The relationship is probabilistic, and for any specific value of m, the Euclidean distance can vary across different experiments. The mean distance over multiple experiments (as calculated in the program) provides an average measure of how far the drunkard is expected to be from the starting point after taking m steps.

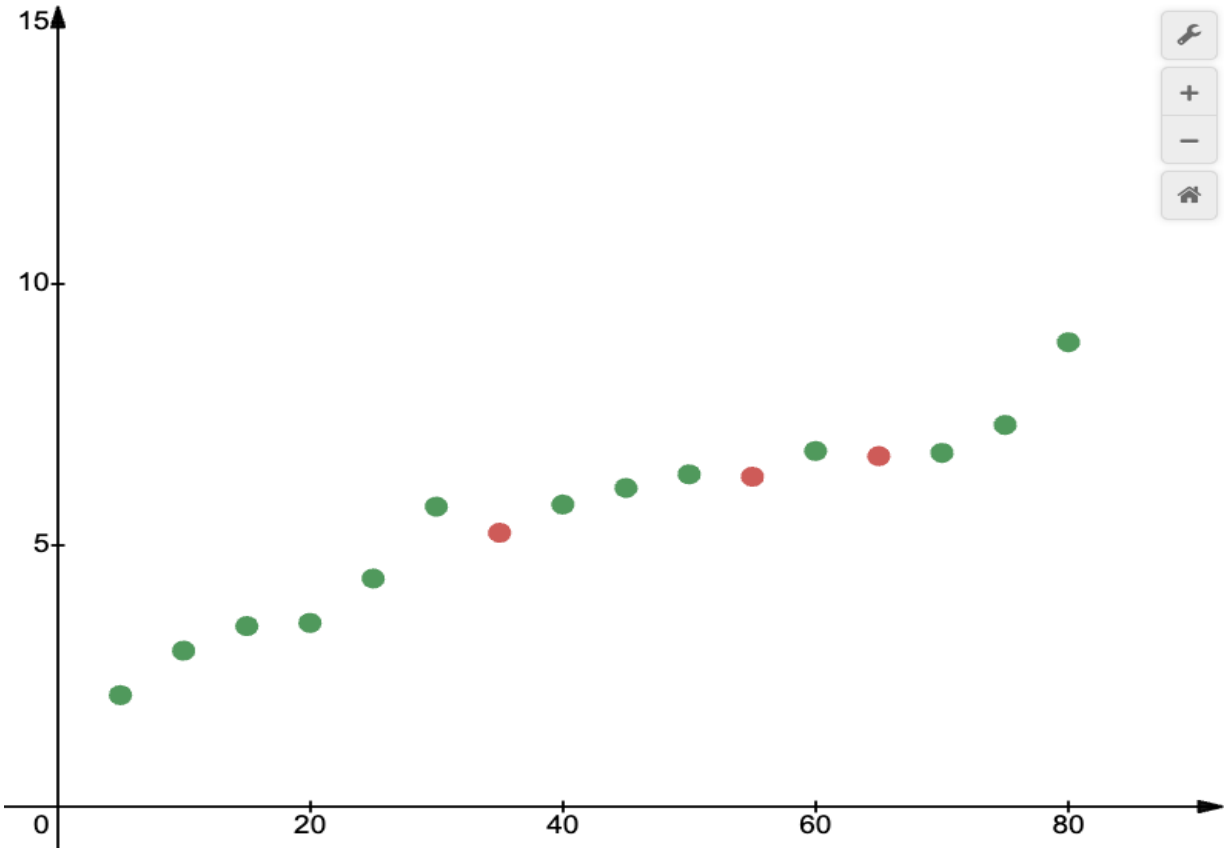
In summary, the relationship between d and m is influenced by randomness, but on average, we expect d to increase as m increases in a random walk scenario.

Based on the output of your code, we can observe the relationship between the number of steps (m) and the mean distance (d) over 60 experiments.

Here are some observations:

- As the number of steps increases (m), the mean distance (d) generally tends to increase.
- The relationship is not strictly linear, and there might be fluctuations in the mean distance for consecutive values of m.
- The mean distance appears to increase more rapidly as m grows larger.

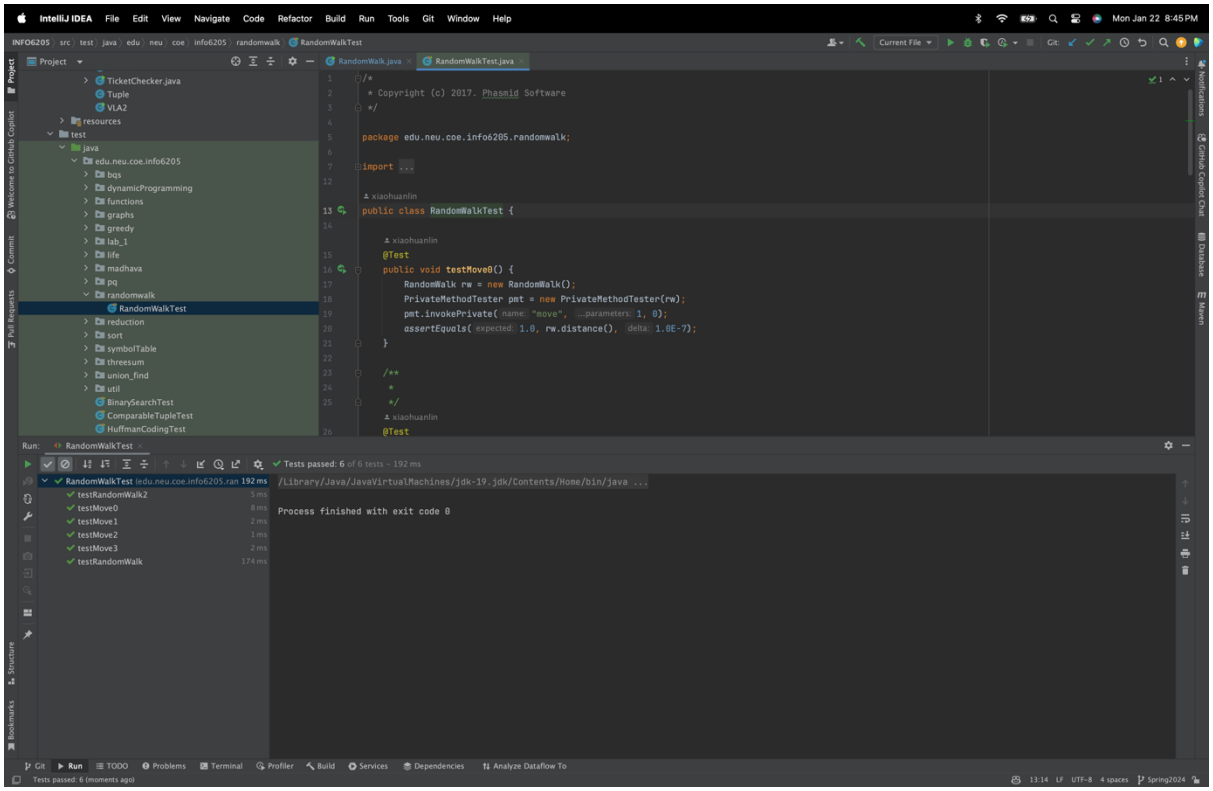
**Evidence to support that conclusion:** Relationship between the number of steps (m) and mean distance (d) using Graph as below.




**x-axis represents the number of steps (m), and the y-axis represents the mean distance (d).**

**We can also use JFreeChart which is a powerful Java library for creating charts and graphs, and it can be integrated directly into your Java program to visualize the relationship between the number of steps (m) and the mean distance (d).**

**Unit Test Screenshots:** All Unit Test Passing




## Output (IntelliJ Console):