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## Program Structures & Algorithms

Fall 2021

### Assignment No. 1

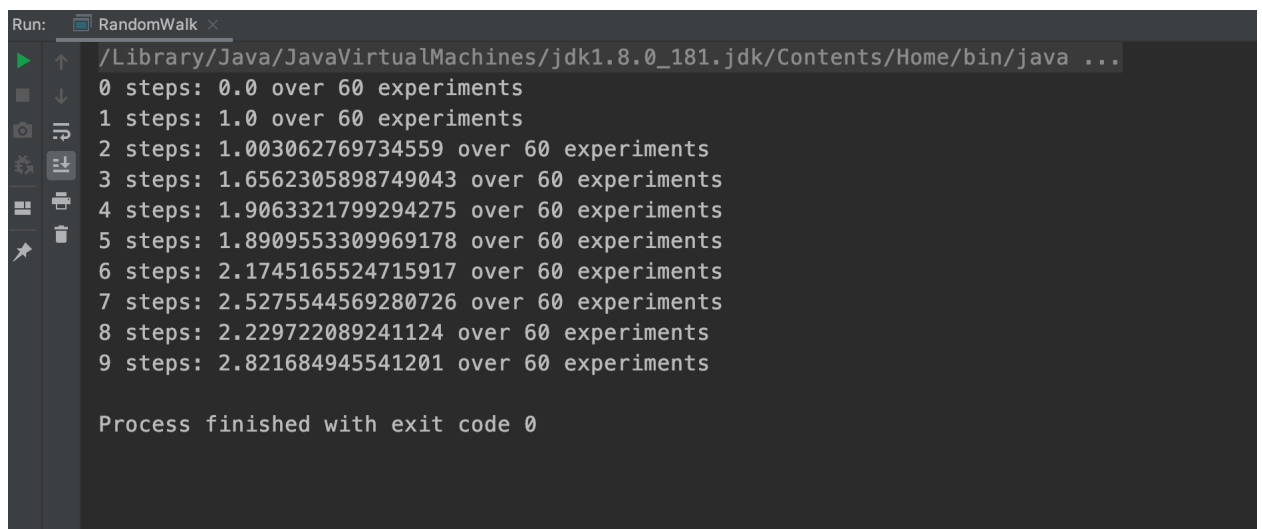
◎ **Task (List down the tasks performed in the Assignment)**

1. Implement `#move()`、`#randomWalk()`、`#distance()` methods
2. Change the main program to print the experiment result
3. deduce the relationship between  $d$  and  $n$
4. get success unit tests result

◎ **Relationship Conclusion:  $d = \sqrt{n}$**

◎ **Evidence to support the conclusion:**

1. **Output**

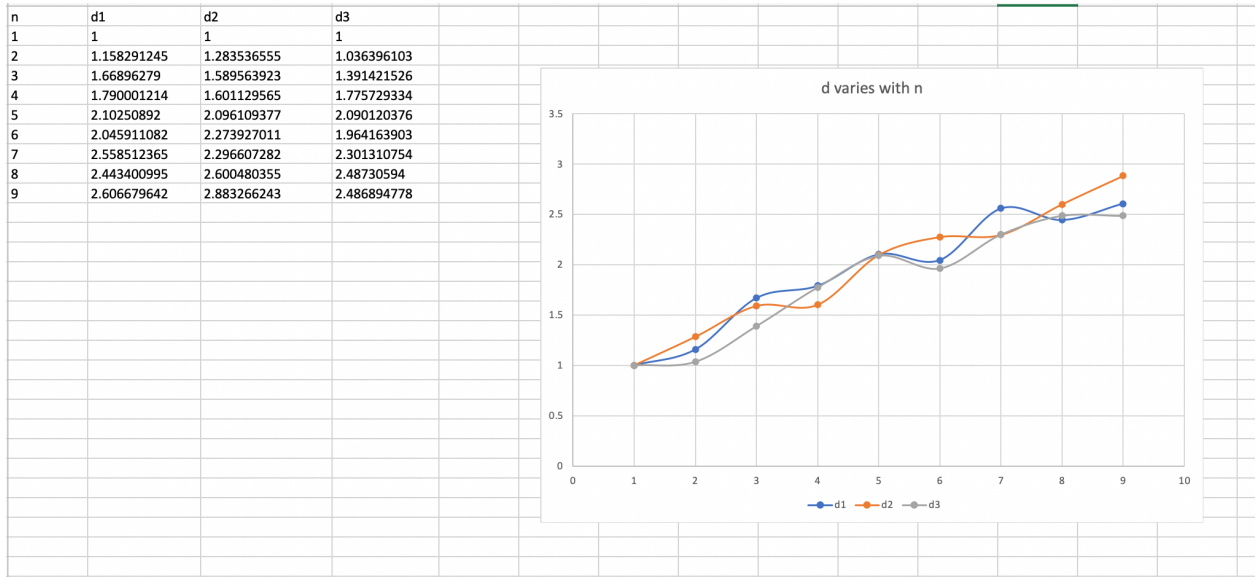


```
Run: RandomWalk x
/Library/Java/JavaVirtualMachines/jdk1.8.0_181.jdk/Contents/Home/bin/java ...
0 steps: 0.0 over 60 experiments
1 steps: 1.0 over 60 experiments
2 steps: 1.003062769734559 over 60 experiments
3 steps: 1.6562305898749043 over 60 experiments
4 steps: 1.9063321799294275 over 60 experiments
5 steps: 1.8909553309969178 over 60 experiments
6 steps: 2.1745165524715917 over 60 experiments
7 steps: 2.5275544569280726 over 60 experiments
8 steps: 2.229722089241124 over 60 experiments
9 steps: 2.821684945541201 over 60 experiments

Process finished with exit code 0
```

After 10 different steps, each 60 experiments, the mean distance of each showed like above.

## 2. Graphical Representation



d1、d2、d3 demonstrates 3 random main program results(mean distance after 600 times' experiments) ; n demonstrates steps. We can conclude from the graph that  $d = \sqrt{n}$ .

### ◉ Unit tests result:

```
Run: RandomWalkTest x
>> Tests passed: 6 of 6 tests - 247 ms
/Library/Java/JavaVirtualMachines/jdk1.8.0_181.jdk/Contents/Home/bin/java ...
Process finished with exit code 0
```