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INFO 6205 - Fall 2021

Assignment No : 1

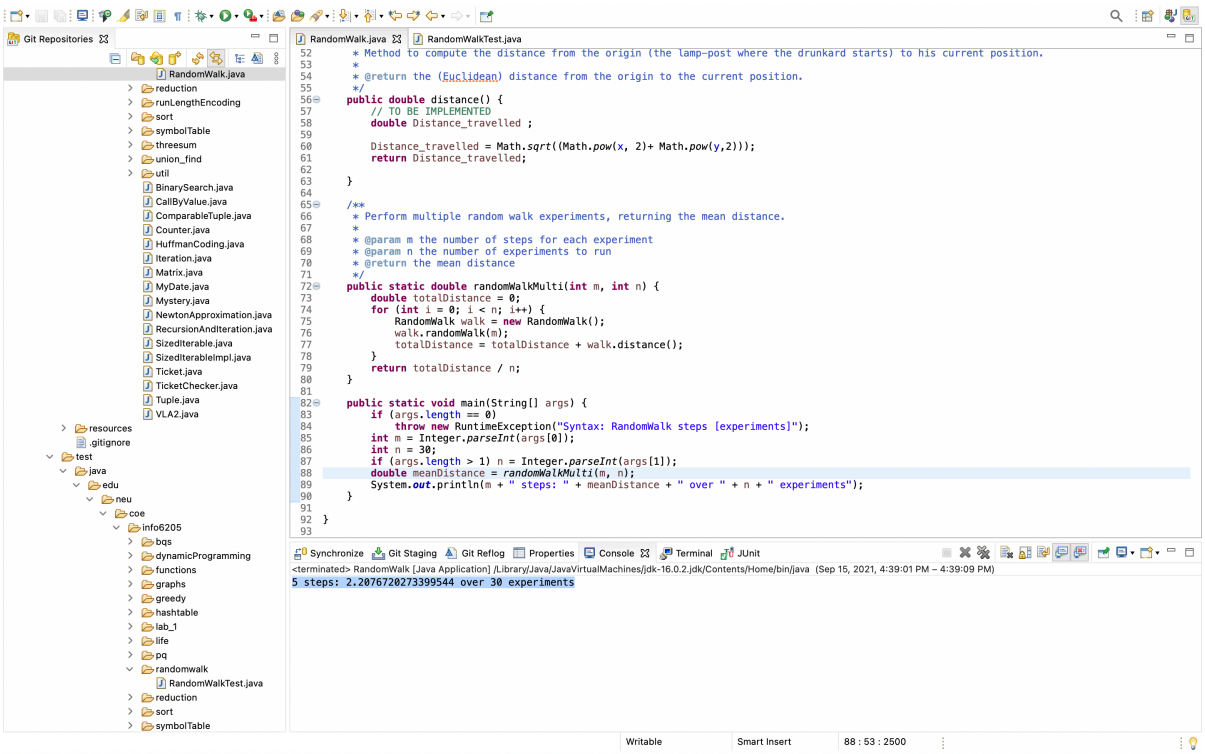
Task : To implement the code for the experiment and to deduce the relationship between the *d* and *n* of a drunken man from lam post by different types of stochastic experiments

Relationship Conclusion : After performing a series of experiments by passing different arguments (5,10,15,20,25,30,35,40), it can be concluded that the Euclidean distance *d* of the man from the lamp-post is approximately equal to the square root of the number of steps walked *n*.

i.e; **d = sqrt(n)**

Evidence to support conclusion :

Output Screenshot :



Evidence:

I have taken average of *d* for 8 different values of n which is approximately equal to the root of n

For n = 5

5 steps: 2.4404351979941117 over 30 experiments
5 steps: 2.1599096923727887 over 30 experiments
5 steps: 2.0735175294416193 over 30 experiments
5 steps: 2.243913706912174 over 30 experiments
5 steps: 2.045593451447232 over 30 experiments
5 steps: 2.23801675260541 over 30 experiments
5 steps: 1.835722243590427 over 30 experiments
5 steps: 2.333043476025397 over 30 experiments

Average of d = 2.17
Root of n = 2.23

For n = 10

10 steps: 2.8947480625564546 over 30 experiments
10 steps: 3.3031225538115407 over 30 experiments
10 steps: 2.7363398677471182 over 30 experiments
10 steps: 2.86759065482386 over 30 experiments
10 steps: 3.2044792087160348 over 30 experiments
10 steps: 2.848690170260767 over 30 experiments
10 steps: 2.448655977679259 over 30 experiments
10 steps: 3.090724617063153 over 30 experiments

Average of d = 2.93.
Root of n = 3.16

For n = 15

15 steps: 3.2114972193200186 over 30 experiments
15 steps: 3.3749132604505325 over 30 experiments
15 steps: 4.1871307702427645 over 30 experiments

15 steps: 3.2154853829957952 over 30 experiments
15 steps: 3.136591424071291 over 30 experiments
15 steps: 3.4490691856370277 over 30 experiments
15 steps: 3.2417291838771987 over 30 experiments
15 steps: 2.9586849878432724 over 30 experiments

Average of d = 3.35
Root of n = 3.87

For n = 20

20 steps: 3.9756369410483647 over 30 experiments
20 steps: 4.254449057098475 over 30 experiments
20 steps: 3.9263366224308234 over 30 experiments
20 steps: 4.177243818906746 over 30 experiments
20 steps: 4.1686999591202 over 30 experiments
20 steps: 4.281253193774356 over 30 experiments
20 steps: 4.118946945304919 over 30 experiments
20 steps: 4.094462286438163 over 30 experiments

Average of d = 4.16
Root of n = 4.47

For n = 25

25 steps: 4.399948095923356 over 30 experiments
25 steps: 4.29639370548835 over 30 experiments
25 steps: 4.429085700892974 over 30 experiments
25 steps: 4.909131363748447 over 30 experiments
25 steps: 4.832626550055396 over 30 experiments
25 steps: 4.0115709699359625 over 30 experiments
25 steps: 4.2966137575891645 over 30 experiments
25 steps: 4.635201343412346 over 30 experiments

Average of d = 4.48
Root of n = 5

For n = 30

30 steps: 3.996059922783582 over 30 experiments
30 steps: 5.345150428646176 over 30 experiments
30 steps: 5.287486569535915 over 30 experiments
30 steps: 4.967214492364156 over 30 experiments
30 steps: 5.58599828746368 over 30 experiments
30 steps: 4.269415673256335 over 30 experiments
30 steps: 5.407305959578097 over 30 experiments
30 steps: 4.736065822574432 over 30 experiments

Average of d = 4.94
Root of n = 5.47

For n = 35

35 steps: 6.089594378765369 over 30 experiments
35 steps: 6.0117632501606435 over 30 experiments
35 steps: 5.880830536636025 over 30 experiments
35 steps: 4.994999923340216 over 30 experiments
35 steps: 4.360754598463723 over 30 experiments
35 steps: 5.274596440475872 over 30 experiments
35 steps: 4.782787136068371 over 30 experiments
35 steps: 4.7464631500480685 over 30 experiments

Average of d = 5.27
Root of n = 5.91

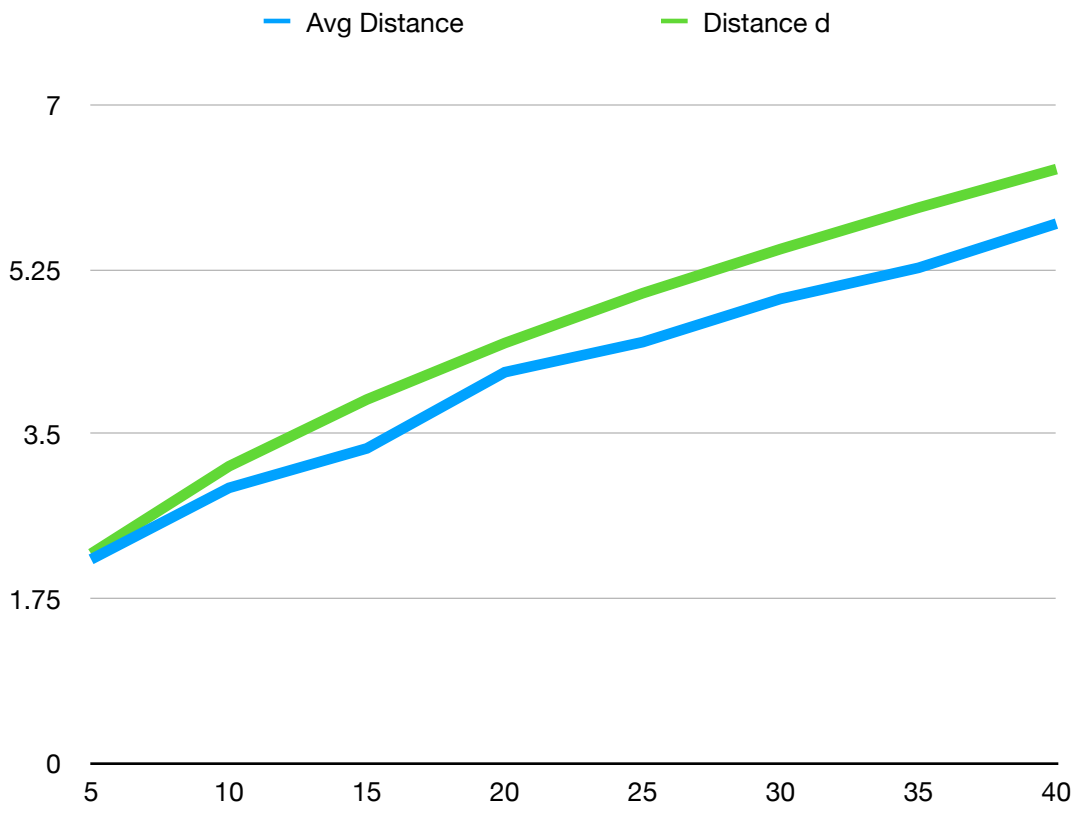
For n = 40

40 steps: 5.48471208251342 over 30 experiments
40 steps: 6.588566448988256 over 30 experiments
40 steps: 5.62584780794113 over 30 experiments
40 steps: 5.730634411295168 over 30 experiments
40 steps: 5.342483268926903 over 30 experiments
40 steps: 5.317888523824119 over 30 experiments
40 steps: 5.728873791841779 over 30 experiments
40 steps: 6.090605349294356 over 30 experiments

Average of d = 5.74

Root of n = 6.32

No. of steps n	d= sqrt(n)	Avg distance calculated from experiments	Diff (%)
5	2.23	2.17	2.69
10	3.16	2.93	7.27
15	3.87	3.35	13.43
20	4.47	4.16	6.93
25	5	4.48	10.4
30	5.47	4.94	9.68
35	5.91	5.27	10.8
40	6.32	5.74	9.17



Unit Tests Result :