INFO 6205
Program Structures & Algorithms
Fall 2020
Assignment 1

Output(only demonstrating part of the outputs)**:**

10 steps: 3.349749907142112 over 30 experiments
10 steps: 3.626718783813882 over 30 experiments
10 steps: 3.079885252270106 over 30 experiments

100 steps: 8.078670486978138 over 30 experiments
100 steps: 8.617156919263541 over 30 experiments
100 steps: 11.556946865446486 over 30 experiments

1000 steps: 26.045079236596642 over 30 experiments
1000 steps: 29.721410820188016 over 30 experiments
1000 steps: 28.08488738716667 over 30 experiments

10000 steps: 95.3142091653186 over 30 experiments
10000 steps: 86.60769663643227 over 30 experiments
10000 steps: 86.76205329599654 over 30 experiments

100000 steps: 267.7995699213689 over 30 experiments
100000 steps: 268.68053286506046 over 30 experiments
100000 steps: 324.98249709402376 over 30 experiments

1000000 steps: 945.2951936594693 over 30 experiments
1000000 steps: 897.4398422026378 over 30 experiments
1000000 steps: 757.9123367155868 over 30 experiments

Conclusion:

$Log_{10}(\mathrm{D}) \approx \frac{Log_{10}(\mathrm{N\ steps})}{2}$

From the above outputs, I deduce that Distance have some certain positive relationship with N steps. When N goes up each time by multiplying ten, Distance also goes up. But the degree of increase of Distance is not as high as N. Therefore, I take the log of both Distance and Steps with the base of ten and find that the log of Distance is approximately equal to half of the log of Steps.

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Evidence:

$\boldsymbol{Log_{10}}$**(N steps)**	$\boldsymbol{Log_{10}}$**(D)**
$Log_{10}(10) = 1$	$Log_{10}(3.3497) = 0.53$
$Log_{10}(100) = 2$	$Log_{10}(8.0786) = 0.91$
$Log_{10}(1000) = 3$	$Log_{10}(26.0450) = 1.42$
$Log_{10}(10000) = 4$	$Log_{10}(95.3142) = 1.98$
$Log_{10}(100000) = 5$	$Log_{10}(267.7995) = 2.43$
$Log_{10}(1000000) = 6$	$Log_{10}(945.2951) = 2.98$