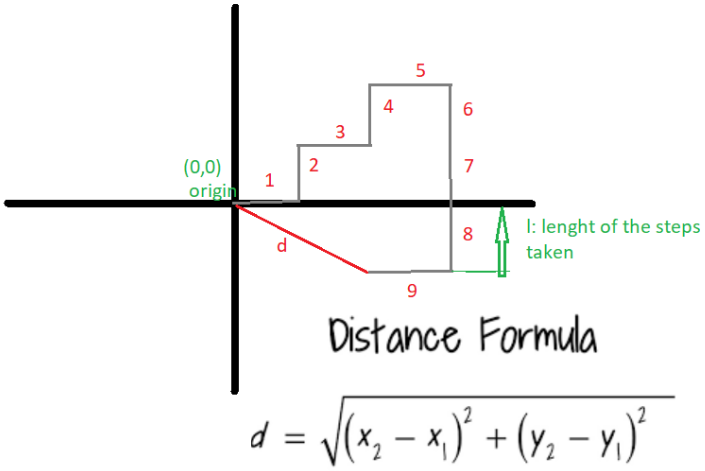
Submitted by : Krapali Rai
NUID: 001813751

Assignment 1:

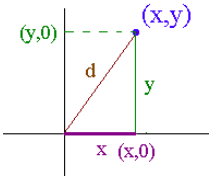
1. Your conclusion about the relationship between d, n and l;

Assumptions:

- The length of the steps are equal.
- There are only 4 directions namely, east, west, north and south.



Equation to find the distance from the origin at a given point P:



d(0, P) = px2 + y2

The random-walk experiment is conducted to observe the behavior of d (distance of the drunkard from the origin) with respect to the number of steps n.

The relationship obtained by observing the stochastic (randomized) is:

D = sqrt(N) *L (Here, l= constant)

We can conclude as follows:

1. D is directly proportional to the square root of N .

Submitted by : Krapali Rai
NUID: 001813751

"From the mean value of readings we can conclude that the D is nearly equals to the sqrt.N ."

$$D_{(\text{mean value})} \approx \sqrt{N} * L$$

2. The distance **D <= N*L** always.
3. The accuracy is proportional to the larger number of readings.
4. The minimum and maximum values of can vary as following:

D(min)=0 for even numbers of steps.

D(min)>0 for odd number of steps.

D(max) <= N for all values of N.

Values of d for :	n=1	n=2	n=3	n=4	n=5	n=10	n=6	n=50	n=100
1	1	2	2.2361	4	4.123	4.242641	0	13.92	13.038
2	1	0	1	2	2.236	2.828427	3.162	5.656	6.3246
3	1	2	2.2361	3.1623	1	2	4.472	7.211	7.616
4	1	1.414	1	0	2.236	0	2	2.828	8.4853
5	1	0	1	2	4.123	2	3.162	2.828	7.616
6	1	1.414	1	1.414	1	1.414214	1.414	8.485	8.4853
7	1	0	2.2361	1.414	2.236	2.828427	2	12	9.487
8	1	2	1	1.414	2.236	4.242641	0	6.324	6
9	1	1.414	2.2361	1.414	3	1.414214	1.414	8.602	7.2111
10	1	0	1	1.414	2.236	4.242641	3.162	3.162	5.831
Experimental value:	1	1.0242	1.49444	1.82323	2.4426	2.52132	2.0786	7.1016	8.00943
Expected value:	1	1.414	1.732	2	2.236	3.162	2.45	7.071	10

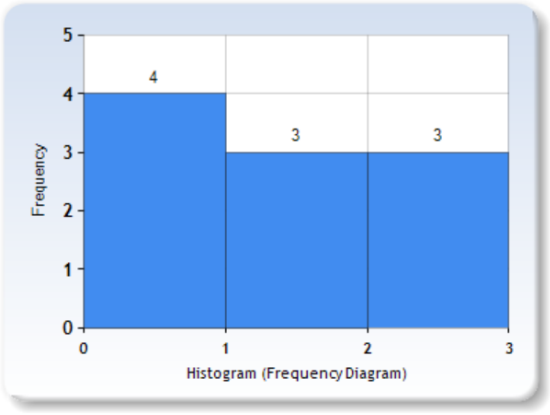
PART 2: Evidence to support that relationship;

No of Steps N= 2:

Submitted by : Krapali Rai
NUID: 001813751

Frequency Table	
Class	*Count*
0-0.999	4
1-1.999	3
2-2.999	3

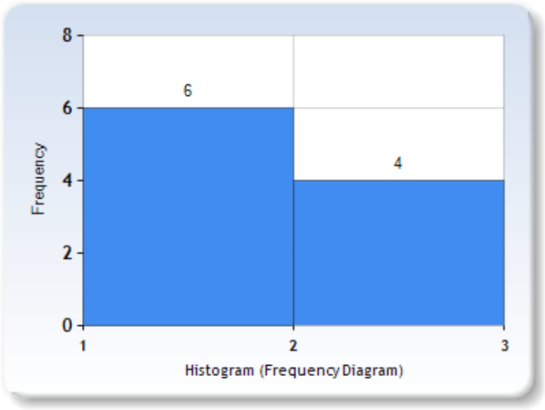
Your Histogram	
Mean	1.0242
Standard Deviation (s)	0.91338
Lowest Score	0
Highest Score	2
Distribution Range	2
Total Number of Scores	10
Number of Distinct Scores	3
Lowest Class Value	0
Highest Class Value	2.999
Number of Classes	3
Class Range	1



No of Steps N= 3:

Frequency Table	
Class	*Count*
1-1.9999	6
2-2.9999	4

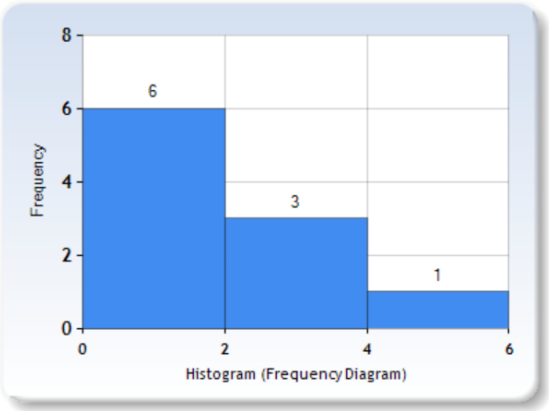
Your Histogram	
Mean	1.49444
Standard Deviation (s)	0.63832
Lowest Score	1
Highest Score	2.2361
Distribution Range	1.2361
Total Number of Scores	10
Number of Distinct Scores	2
Lowest Class Value	1
Highest Class Value	2.9999
Number of Classes	2
Class Range	1



No of Steps N= 4:

Frequency Table	
Class	*Count*
0-1.9999	6
2-3.9999	3
4-5.9999	1

Your Histogram	
Mean	1.82323
Standard Deviation (s)	1.09318
Lowest Score	0
Highest Score	4
Distribution Range	4
Total Number of Scores	10
Number of Distinct Scores	5
Lowest Class Value	0
Highest Class Value	5.9999
Number of Classes	3
Class Range	2

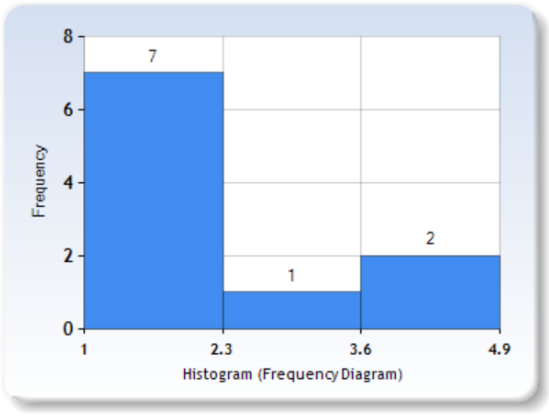


Submitted by : Krapali Rai
NUID: 001813751

No of Steps N= 5:

Frequency Table	
Class	*Count*
1-2.299	7
2.3-3.599	1
3.6-4.899	2

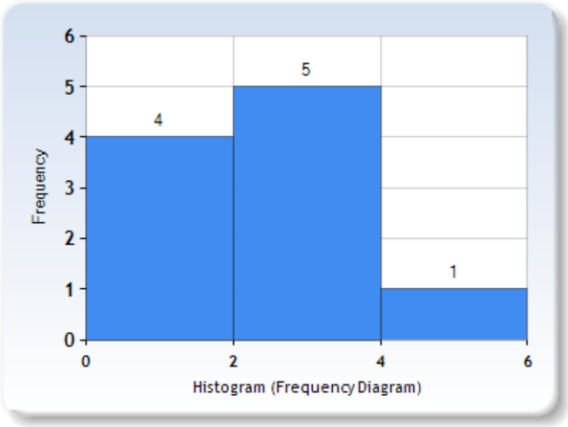
Your Histogram	
Mean	2.4426
Standard Deviation (s)	1.07154
Lowest Score	1
Highest Score	4.123
Distribution Range	3.123
Total Number of Scores	10
Number of Distinct Scores	4
Lowest Class Value	1
Highest Class Value	4.899
Number of Classes	3
Class Range	1.3



No of Steps N= 6:

Frequency Table	
Class	*Count*
0-1.999	4
2-3.999	5
4-5.999	1

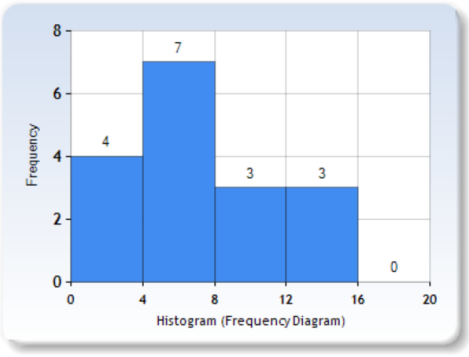
Your Histogram	
Mean	2.0786
Standard Deviation (s)	1.44478
Lowest Score	0
Highest Score	4.472
Distribution Range	4.472
Total Number of Scores	10
Number of Distinct Scores	5
Lowest Class Value	0
Highest Class Value	5.999
Number of Classes	3
Class Range	2



No of Steps N= 10:

Frequency Table	
Class	*Count*
0-3.99999	4
4-7.99999	7
8-11.99999	3
12-15.99999	3
16-19.99999	0

Your Histogram	
Mean	7.86062
Standard Deviation (s)	4.94553
Lowest Score	1.41421
Highest Score	20
Distribution Range	18.58579
Total Number of Scores	18
Number of Distinct Scores	15
Lowest Class Value	0
Highest Class Value	19.99999
Number of Classes	5
Class Range	4

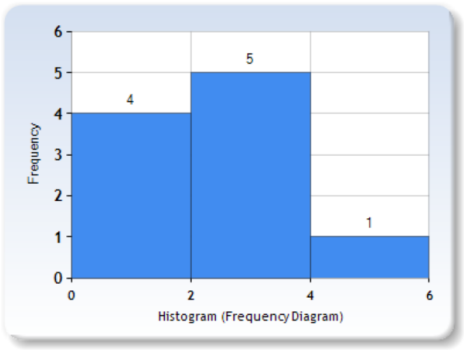


Submitted by : Krapali Rai
NUID: 001813751

Number of steps N= 50 for 10 iterations

Frequency Table	
Class	*Count*
0-1.999	4
2-3.999	5
4-5.999	1

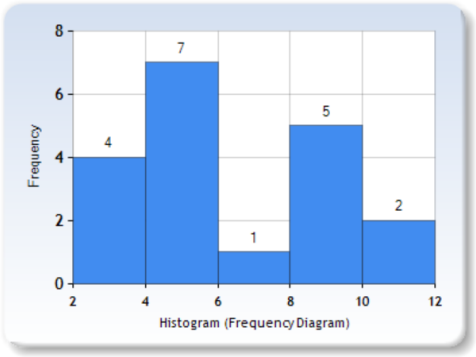
Your Histogram	
Mean	2.0786
Standard Deviation (s)	1.44478
Lowest Score	0
Highest Score	4.472
Distribution Range	4.472
Total Number of Scores	10
Number of Distinct Scores	5
Lowest Class Value	0
Highest Class Value	5.999
Number of Classes	3
Class Range	2



N= 50 for 20 iterations

Frequency Table	
Class	*Count*
2-3.999	4
4-5.999	7
6-7.999	1
8-9.999	5
10-11.999	2

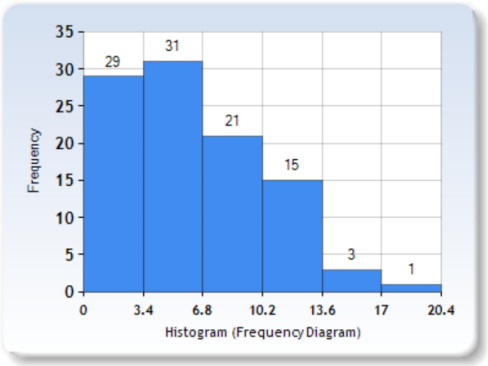
Your Histogram	
Mean	6.3848
Standard Deviation (s)	2.88836
Lowest Score	2
Highest Score	12
Distribution Range	10
Total Number of Scores	20
Number of Distinct Scores	13
Lowest Class Value	2
Highest Class Value	11.999
Number of Classes	5
Class Range	2



N=50 for 100 iterations.

Frequency Table	
Class	*Count*
0-3.3999	29
3.4-6.7999	31
6.8-10.1999	21
10.2-13.5999	15
13.6-16.9999	3
17-20.3999	1

Your Histogram	
Mean	6.35609
Standard Deviation (s)	3.8347
Lowest Score	0
Highest Score	18.439
Distribution Range	18.439
Total Number of Scores	100
Number of Distinct Scores	38
Lowest Class Value	0
Highest Class Value	20.3999
Number of Classes	6
Class Range	3.4



Submitted by : Krapali Rai
NUID: 001813751

Part-4: Evidence (screen shot) of the unit tests all passing: