Assignment 1:

**1)Conclusion about the relationship between d, N and L**

After running the code for 30 times, I could conclude that distance is approximately equal to the square root of number of steps taken.

**L=d/sqrt(N)**

Where: L=length of the steps taken

d=distance from the post

N=number of steps taken

**2) Evidence to support the relationship**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Steps(N) | Distance(d) | Sqrt(N) | Avg(d) |  |  |  |  |  |  |  |  |  |  |  |
| 5 | 2.2 | 2.23 | 2.63 |  |  |  |  |  |  |  |  |  |  |  |
| 5 | 3.6 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | 2.23 |  |  |  |  |  | | | | | | | | |
| 5 | 4.12 |  |  |  |  |
| 5 | 1 |  |  |  |  |
| 10 | 1.41 | 3.16 | 3.05 |  |  |
| 10 | 2 |  |  |  |  |
| 10 | 4.24 |  |  |  |  |
| 10 | 4.47 |  |  |  |  |
| 10 | 3.16 |  |  |  |  |
| 20 | 6.32 | 4.47 | 4.39 |  |  |
| 20 | 3.16 |  |  |  |  |
| 20 | 5.09 |  |  |  |  |
| 20 | 3.16 |  |  |  |  |
| 20 | 4.24 |  |  |  |  |
| 50 | 3.16 | 7.07 | 6.2 |  |  |
| 50 | 10.19 |  |  |  |  |
| 50 | 1.41 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 | 13.03 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 50 | 2.82 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 100 | 11.31 | 10 | 9.93 |  |  |  |  |  |  |  |  |  |  |  |
| 100 | 9.055 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 100 | 11.4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 100 | 7.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 100 | 10.77 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 150 | 15.81 | 12.24 | 13.38 |  |  |  |  |  |  |  |  |  |  |  |
| 150 | 8.48 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 150 | 9.48 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 150 | 16.12 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 150 | 17.02 |  |  |  |  |  |  |  |  |  |  |  |  |  |

**3) Code**

**package** Homework1;

**import** java.util.Random;

**public** **class** RandomWalk {

**private** **int** x = 0;

**private** **int** y = 0;

**private** **final** Random random = **new** Random();

**public** **void** move(**int** dx, **int** dy) {

// **TODO** you need to implement this

x += dx;

y += dy;

}

**private** **void** randomWalk(**int** n) {

**for** (**int** i = 0; i < n; i++)

randomMove(n);

}

**private** **void** randomMove(**int** var) {

// **TODO** you need to implement this

**double** num = Math.*random*();

//System.out.println("Random number:"+r);

**if**(num<0.25)

{

y++;

System.***out***.println("North"+" "+"Random number:"+num);

}

**else** **if** (num<0.5)

{

x++;

System.***out***.println("East"+" "+"Random number:"+num);

}

**else** **if** (num<0.75)

{

x--;

System.***out***.println("West"+" "+"Random number:"+num);

}

**else**

{

y--;

System.***out***.println("South"+" "+"Random number:"+num);

}

}

**public** **double** distance() {

// **TODO** you need to implement this

**return** Math.*sqrt*(x\*x + y\*y);

}

**public** **static** **void** main(String[] args) {

**int** n = 5;

RandomWalk walk = **new** RandomWalk();

walk.randomWalk(n);

System.***out***.println(n + " steps: " + "distance--" + walk.distance());

}

}

**4) Evidence (screen shot) of the unit tests all passing.**

