Program Structures and Algorithms

Spring 2024

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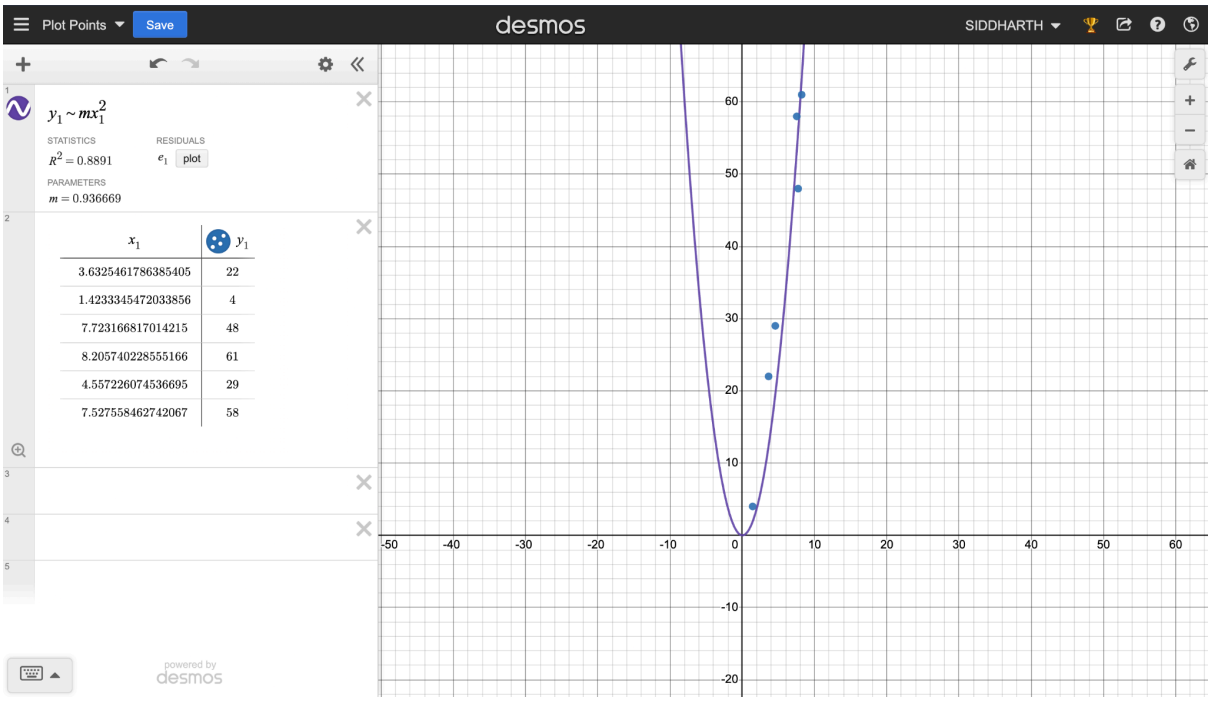
GITHUB LINK: https://github.com/dumbresi/Info-6205-spring2024

Task: Random Walk Assignment

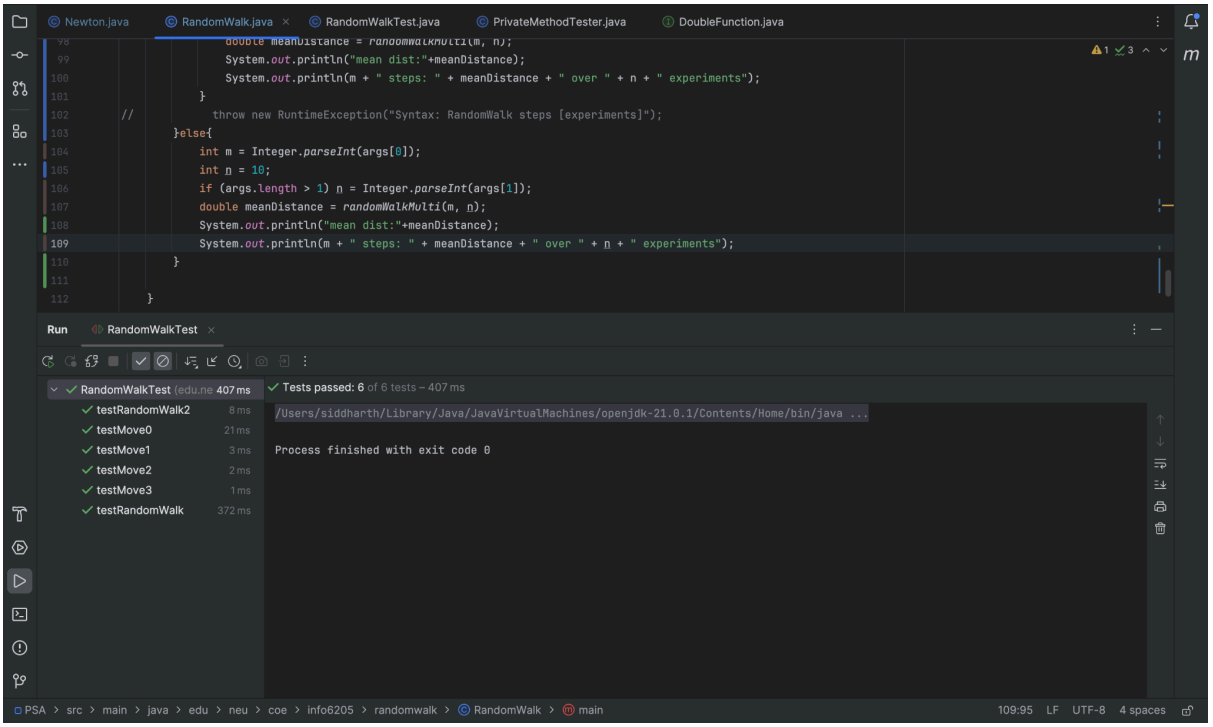
Relationship Conclusion:
There is a quadratic relationship between the number of steps-m and Euclidean distance d. The

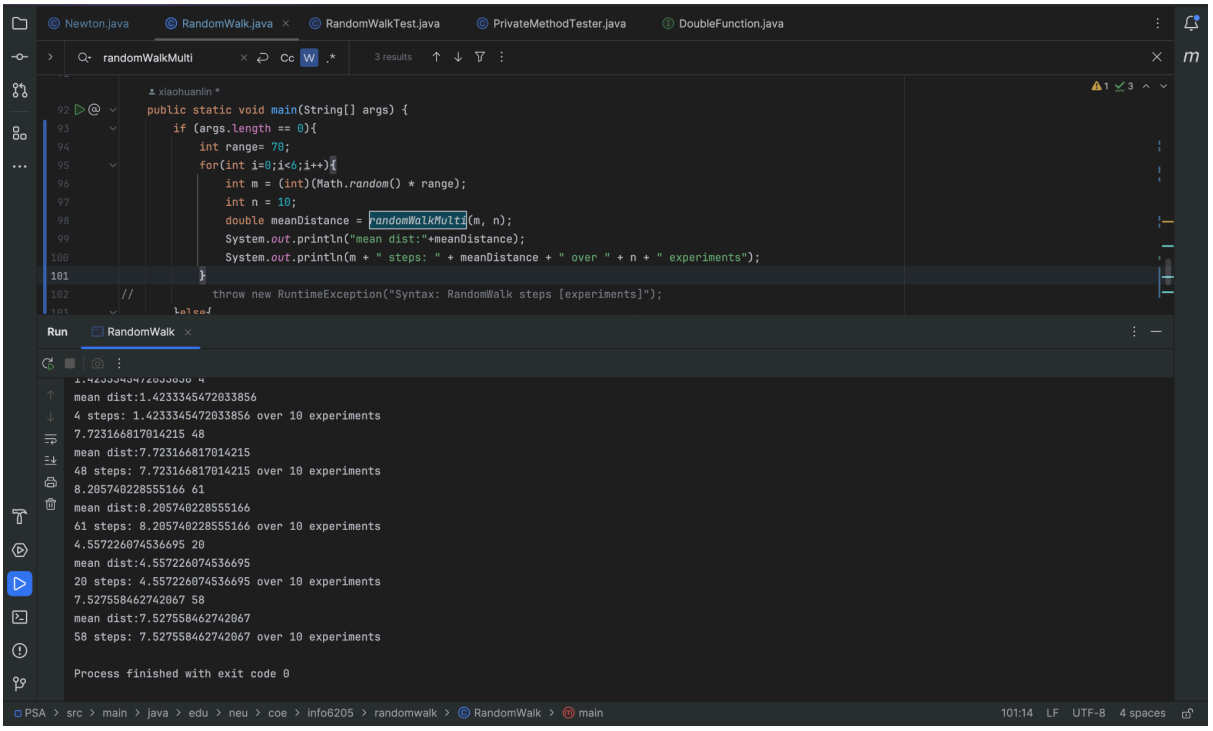
Evidence to support that conclusion:

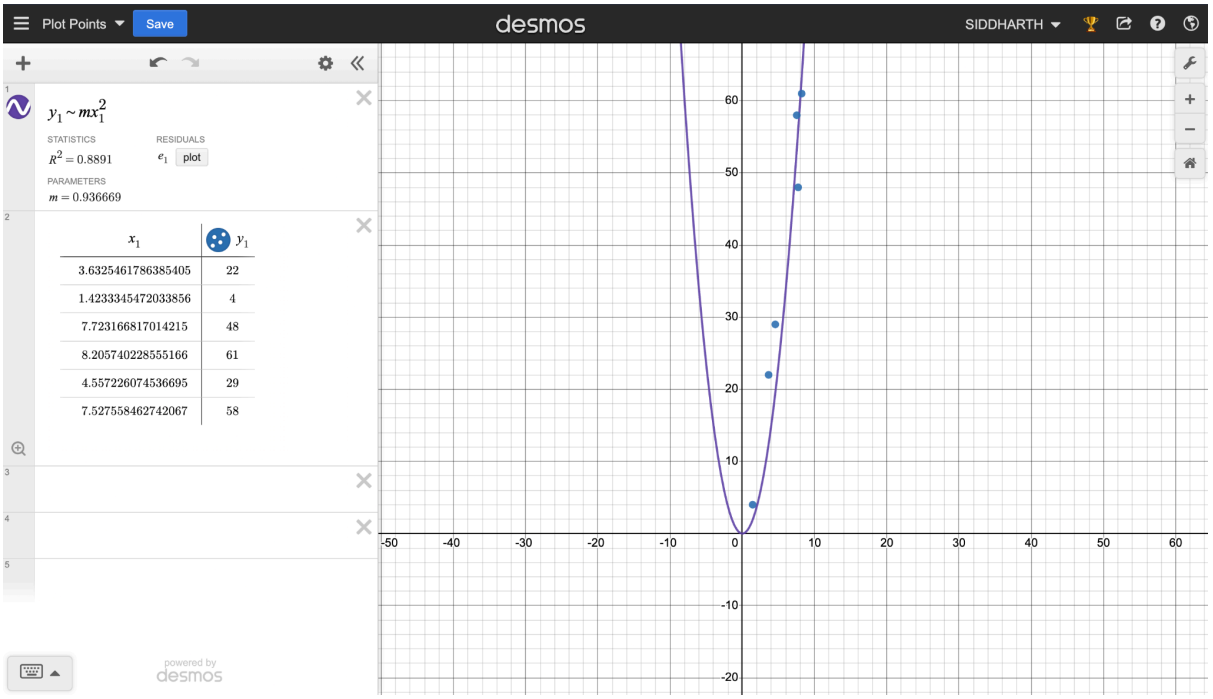
I plotted the points on a graph and tried to find the relation between x and y coordinates, it best fits a parabola.



Unit Test Screenshots:


Newton.java
RandomWalk.java
RandomWalkTest.java
PrivateMethodTester.java
DoubleFunction.java
double meanDistance = randomWalkMulti(m, n);
System.out.println("mean dist:"+meanDistance);
System.out.println(m + " steps: " + meanDistance + " over " + n + " experiments");
}
// throw new RuntimeException("Syntax: RandomWalk steps [experiments]");
}else{
int m = Integer.parseInt(args[0]);
int n = 10;
if (args.length > 1) n = Integer.parseInt(args[1]);
double meanDistance = randomWalkMulti(m, n);
System.out.println("mean dist:"+meanDistance);
System.out.println(m + " steps: " + meanDistance + " over " + n + " experiments");
}
}
Run
RandomWalkTest
RandomWalkTest (edu.ne 407 ms
testRandomWalk2 8 ms
testMove0 21 ms
testMove1 3 ms
testMove2 2 ms
testMove3 1 ms
testRandomWalk 372 ms
Tests passed: 6 of 6 tests – 407 ms
/Users/siddharth/Library/Java/JavaVirtualMachines/openjdk-21.0.1/Contents/Home/bin/java ...
Process finished with exit code 0
PSA > src > main > java > edu > neu > coe > info6205 > randomwalk > RandomWalk > main
109:95 LF UTF-8 4 spaces


Newton.java
RandomWalk.java
RandomWalkTest.java
PrivateMethodTester.java
DoubleFunction.java
randomWalkMulti
3 results
xiaohuanlin *
public static void main(String[] args) {
if (args.length == 0){
int range= 70;
for(int i=0;i<6;i++){
int m = (int)(Math.random() * range);
int n = 10;
double meanDistance = randomWalkMulti(m, n);
System.out.println("mean dist:"+meanDistance);
System.out.println(m + " steps: " + meanDistance + " over " + n + " experiments");
}
// throw new RuntimeException("Syntax: RandomWalk steps [experiments]");
Run
RandomWalk
mean dist:1.4233345472033856
4 steps: 1.4233345472033856 over 10 experiments
7.723166817014215 48
mean dist:7.723166817014215
48 steps: 7.723166817014215 over 10 experiments
8.205740228555166 61
mean dist:8.205740228555166
61 steps: 8.205740228555166 over 10 experiments
4.557226074536695 20
mean dist:4.557226074536695
20 steps: 4.557226074536695 over 10 experiments
7.527558462742067 58
mean dist:7.527558462742067
58 steps: 7.527558462742067 over 10 experiments
Process finished with exit code 0
PSA > src > main > java > edu > neu > coe > info6205 > randomwalk > RandomWalk > main
101:14 LF UTF-8 4 spaces


Plot Points
Save
desmos
SIDDHARTH
$y_1 \sim mx_1^2$
STATISTICS
$R^2 = 0.8891$
RESIDUALS
e_1
plot
PARAMETERS
$m = 0.936669$
x_1
y_1
3.6325461786385405 22
1.4233345472033856 4
7.723166817014215 48
8.205740228555166 61
4.557226074536695 29
7.527558462742067 58
powered by desmos