**HW 4: Projectile Motion**

Problem Description:

You are to create a program that simulate the launching of two projectiles at a given angle, height, and initial velocity. These projectiles stop moving once they hit the ground and you are to calculate the distance between them. GUI is **NOT** required.

Projectile motion equations:

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|  | X: x displacement  X0: initial x displacement  Y: y displacement  Y0: initial y displacement  Vo: initial velocity  t: time  : initial angle  g: gravitational constant |
| Keep in mind that the X and Y displacement is the distance from the projectiles origin at a given time stamp. See examplebelow. | |

Program Requirements:

1. The program shall use the first quadrant of a 2D coordinate plane.
2. The program shall have 2 projectiles named Hare and Hound.
3. The program shall have the projectiles follow projectile motion equations.
4. The Hare shall have a random initial angle ranging from 0 to 90 degrees.
5. The Hare shall have a random initial velocity ranging from 70 to 120 meters per second.
6. The Hare shall have a random initial height ranging from 400 to 1000 meters.
7. The Hound shall have a random initial angle ranging from 0 to 90 degrees.
8. The Hound shall have a random initial velocity ranging from 50 to 150 meters per second.
9. The Hound shall have a starting height of 600 meters.
10. The Hare shall stop moving once it hits the ground.
11. The Hound shall stop moving once it hits the ground.
12. The program shall calculate the distance between the Hare and the Hound once they have both hit the ground.
13. The program shall start both Hare and Hound on the left side of the screen (x = 0).
14. The program shall define ground as constant horizontal line.

Homework Requirements:

1. The program shall run 2 iterations.
2. An Iteration shall consist of:
   1. Setting up the Hare and hound (see Program Requirements 4-9)
   2. Firing the Hare and Hound to follow projectile motion.
      1. The program shall display the flight path in time intervals of .5 seconds
   3. Once the Hare and Hound hit the ground, the program shall display the distance between the Hare and the Hound
3. Iteration 1 shall have a ground shall defined as y = 0.
4. Iteration 2 shall have a ground shall defined as y = 120.
5. The program shall have 2 classes Manager and Projectile.
6. The Projectile class shall handle the location and movement.
7. The Manager class shall handle the 2 iterations using Projectile objects.

Time estimate: 2-4 hours

Deliverables: Manager.java and Projectile.java

Rubric:

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| **Deliverable** | **Points** | **Awarded** |
| Code compilation | 5 |  |
| Fulfilled the program and homework requirements | 25 |  |
| Totals | 30 |  |

*Example:*



