Lab 4

Direction: Submit the typed source code or git url. All tasks must be completed; however, each team member is required to do at least 1 task.

Projectile

For this lab, you will define essential functions to calculate the path of a projectile. A projectile is an object in free fall released at an angle. The equations for an object in free fall are:

$$
\begin{aligned}
v_f &= v_i + at \\
s_f &= s_i + v_i t + \tfrac{1}{2}at^2 \\
v_f^2 &= v_i^2 + 2a(s_f - s_i) \\
s_f &= s_i + \tfrac{1}{2}(v_i + v_f)t
\end{aligned}
$$

where s, v, a, t are displacement, velocity, acceleration and time respectively. Since a projectile is released at an angle, the equations have a vertical and horizontal version. The main differences are with initial velocity and acceleration. For the vertical equations, displacement is referred to as height, initial velocity is $v\sin\theta$, and acceleration is $-9.8m/s^2$ where v is the magnitude of the total intial velocity. For the horizontal equations, initial velocity is $\cos\theta$ and acceleration is $0m/s^2$.

Your group will have to rewrite the given functions so that they perform their descriptions correctly. Assume that initial displacement is 0 for both the horizontal and vertical.

I.

Name:	`height()`
Parameter(s):	v: `double` t: `double` a: `double`
Return:	double
Description:	returns the height for the given initial velocity (v), time (t) and angle (a).

II.

Name:	`displacement()`
Parameter(s):	v: `double` t: `double` a: `double`
Return:	double
Description:	returns the displacement for the given initial velocity (v), time (t) and angle (a).

III.

Name:	`velocity()`
Parameter(s):	v: `double` t: `double` a: `double`
Return:	double
Description:	returns the final velocity for the given initial velocity (v), time (t) and angle (a).

IV.

Name:	`stats()`
Parameter(s):	v: `double`
	t: `double`
	a: `double`
Return:	string
Description:	returns a string consisting of the time, velocity, height and displacement in that order each taking up 20 spaces and rounded to two decimal places on its own line.