

1. Identify a situation (not discussed in class) that might benefit from a simulation. Why would you not want to / not be able to "do it for real"?

Solution -

Development of formula 1 cars benefit from simulations as it allows teams to test the car before the season begin because they are not allowed to run it on the track before the first race. The reason simulation is preferred over doing it in real in this scenario is due to huge amount of cost related to testing and regulation preventing the teams/companies to test the cars on the tracks.

2. Consider the following situation:

A projectile is fired from a gun at a velocity v_i . The equations of motion for this case are:

$$x(t) = v_i \cdot t + \frac{1}{2}g \cdot t^2$$

$$y(t) = \frac{1}{2}g \cdot t^2$$

a) What are the **dependent** and **independent** variables?

Solution

In $x(t)$, the independent variables is time and dependent variable is Position

In $y(t)$, the independent variables is time

b) Considering this set of equations assumes a projectile being fired in a vacuum, is this a good model for real life? What is missing?

Solution

If the projectile is fired in vacuum, It is not a good model because the value of gravity changes in the space. Changes in the gravity have numerous side effects such as change in weight and size. Also when the projectile is fired in Vacuum, the object will fire away and keep going until it hits a matter.

3. Download [lab1.blend](#) and familiarize yourself with the environment.

a) Press "p" to begin the simulation while your cursor is in the 3D view box. Observe what happens to the apple. **Does this behavior seem natural to you? Why or why not?**

Solution -

b) Press 'esc' to stop the simulation. You can fix the simulation by changing a couple lines of code. **Which lines did you change and what did you change them to?**

Solution -

A - The behaviour is natural as that's how a apple will fall from a tree

B -

#By changing this code, the apple will fall faster and will increment by 0.02 per frame

```
own.position.z -= 0.02
```

#By changing this code, the apple will fall and stop halfway. Just to make the appear the simulator stopped working

```
own.position.z >= 0
```