**THREE DIMENSIONAL SIMULATION OF SPACE.**

State is defined as-

* The current position in terms of x, y, z coordinates.
* The current velocity in x, y, z axis
* Radius of the object
* Mass of the object

The solar system consists of stars, planets and asteroids as space objects. Consider a hypothetical situation where the only forces influencing the space objects is the gravitational force between them.

You are given a dataset representing the current state of the solar system and time is denoted by ‘t’.

Your objective is to simulate and arrive at the state of all space objects when t = 1e+6 (unless otherwise specified for the test case).

**Constraints:**

* **General:**
* Smallest unit of time for simulation is 1-unit time, i.e. time can only be an integer
* 1e+14 < Mass of stars <= 1e+15 units
* 1e+4 < Mass of planets <= 1e+7 units
* 0 < Mass of asteroid <= 0.01 units
* Consider Acceleration to be constant during each time interval dt = 1-unit time.
* Consider G = 7\*1e+4 units
* **Collision Mechanism:**
* Collisions between Planet-Planet and Planet-Star are not taken into consideration and hence, do not exist in the dataset.
* Collisions between asteroid-planet and asteroid-star leads to destruction of the asteroid.
* Collisions between asteroid-asteroid leads to the destruction of both the asteroids.

**Objective:**

* You are to note the time at which the collision takes place.
* You are to note the time at which the asteroid goes too far away from the sun, i.e. beyond 6\*1e+10 unit of distance.

Note that, any activity of the space system taking place at a distance beyond 6\*1e10 is not taken into consideration.

You are given basic modules to read/save data into an excel file. All you need to do is to build the logical module for the question above.

**Evaluation** will be done on the basis of:

* Primary Evaluation is done in such a way as to check accuracy of time of collision of asteroid.
* Secondary Evaluation is done in such a way as to check accuracy of state of space objects.
* Efficiency of your program may also be tested in case of a draw.

**Sample Test Cases:**

**Orbit:** 1M units of time, 2 objects

The answer for Orbit is the excel sheet named **“Orbit Final”.**

**Sample 1:** 0.1M units of time, 4 objects

The answer for Sample 1 is the excel sheet named **“Final 1”.**

**Sample 2**: 0.1M units of time, 4 objects

The answer for Sample 2 is the excel sheet named **“Final 2”.**

**Test Cases:**

**Test2:** 0.7M units of time, 7 objects.

**Test 3**: 1M units of time, 7 objects.

**Test 4**: 1M units of time, 10 objects.

**Test 5**: 0.8M units of time, 10 objects.

**Sample Dataset:**

A sample Dataset before and after simulation is given below

