Lab Four (Python 2.7)

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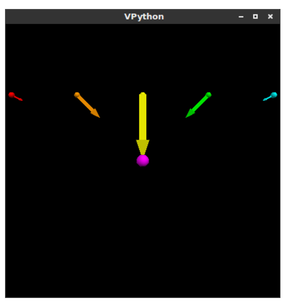
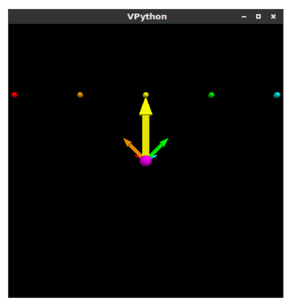
Orbits were made on VIDLE

Question 64



(a) Visual output of P64 (a)



(b) Visual output of P64 part d (b)

Question 65

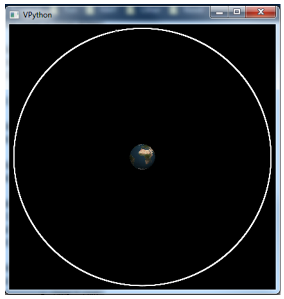
An elliptical orbit can be produced of by the initial velocity,

$$< 0, 0.75 \cdot \sqrt{G \cdot \frac{M_{earth}}{(|\vec{x}_{craft}| \cdot D)}}, 0 > \ . \tag{1}$$

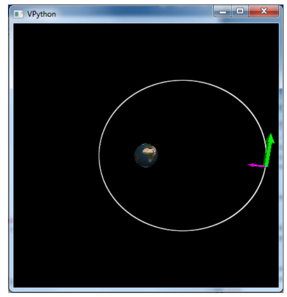
Where G is the gravitational constant, and D is the distance between the Earth and the craft. A circular path can be formed by the initial velocity, vector(-2e3,0,0).

$$< 0, \sqrt{G \cdot \frac{M_{earth}}{(|\vec{x}_{craft}| \cdot D)}}, 0 > \ . \tag{2}$$

The time step that gives enough accuracy to produce a closed circular orbit is 60 seconds.



(c) Visual output for circular orbit (a)



(d) Visual output for elliptical orbit (b)

Question 66

Figure 1: Visual output for P66

At the current moment, I do not think that a figure eight orbit can be produced.

Question 68

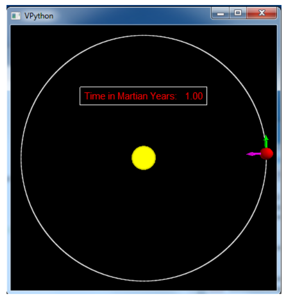


Figure 2: Visual output of P68

The period of the orbit displayed in the figure above is equivalent to,

$$T = 59356800\,s\,. \tag{3}$$

To produce non-circular orbits, multiply the initial velocity of Mars by a scalar value less than one.

Question 69

When the second star has the speed of the earth and the momentum of the primary star is zero the system moves in the positive y-direction.
The motion of the stars when the total momentum is zero and the stars are not headed towards each other is interesting because one star is moving in a corkscrew trajectory while the other star is moving in a semicircle trajectory.

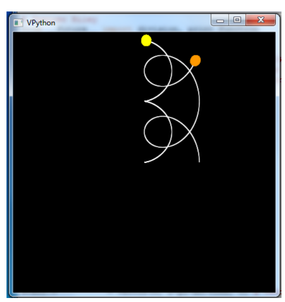


Figure 3: Visual output of P69