

Loops and Orbits - Homework 2 - A Rocket

Due end of office hours (2pm)

Thursday 2020-01-16

Turn in - the three graphs

Directions

* Make a copy of notebook Z-2 (that was Home Run with Air Resistance). Call the copy rocket.ipynb

* Instead of air resistance which opposes velocity, you are going to put in thrust in the direction of Velocity.

* Assumptions to add to initialization:

* the initial speed is 4.5 m/s

* the initial angle is 60°

* the rocket has only 1 second of fuel. Make a new variable:

In notebook
Z-2 this
was 30 In notebook
Z-2 this
was 60

* rocket_burn_time = 1.0

the rocket has 3 g's of thrust. Make a new variable:

$$\text{rocket_thrust} = 3.0 * g$$

* That's all the directions, but there are some hints on the next page.

Hints for Homework 2

- * Ditch the function acceleration_with_drag
- * Add a function acceleration_with_thrust
- * Have this new function take three arguments:

def acceleration_with_thrust (time, horizontal_velocity, vertical_velocity):

- * This function's implementation is going to have an if/else in it:

if time > rocket_burn_time:

 return 0.0, -g ← only gravity once
else:
 fuel runs out

lots more goes here

 return —, —

Checking Homework 2

On the three graphs that you turn in,
you can be pretty sure you are right
if:

- * the rocket clears the outfield fence
by about 8 m

* there is a kink in the horizontal velocity
graph when the fuel runs out at 1 second.

- * there is also a kink in the vertical velocity graph.