Exercises for Day 2

Exercise 1. ***Using a script***, print these lines to a file called `Day2_Ex1.txt`:

```
My name is yyy.
I am in Computer Programming I Section xx this quarter.
```

You should use **TWO** `fprintf` statements to accomplish this task. You should also replace `yyy` and `xx` with appropriate text. Using the homework template, submit the code you typed in your script and the output to the text file `Day2_Ex1.txt`.

Exercise 2. We wish to find the roots, x_1 and x_2, of the equation

$$ax^2 + bx + c = 0$$

for $a = 1$, $b = 22$, and $c = 120$ using the quadratic formula:

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad , \qquad x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Write a script that:

- Assigns $a = 1$, $b = 22$, and $c = 120$
- Calculates x_1 and x_2
- Prints the answers to a text file, along with appropriate words. For example:

```
When a = 1, b = 22, and c = 120, the first root is XXXXX
and the second root is XXXXX.
```

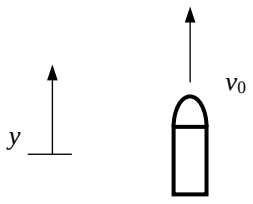
Using the homework template, submit the code you typed in your script and the output to the text file.

Exercise 3. Let us consider a very simple model which enables us to predict the vertical trajectory of a rocket.

With an initial vertical launch velocity v_0, the rocket decelerates on its way up due to gravitational pull, g. If we neglect the effect of air resistance, the rocket vertical velocity v and displacement y measured with respect to the launch location can be modeled by

$$v(t) = v_0 - g\,t$$

$$y(t) = v_0\,t - \frac{1}{2}\,g\,t^2$$



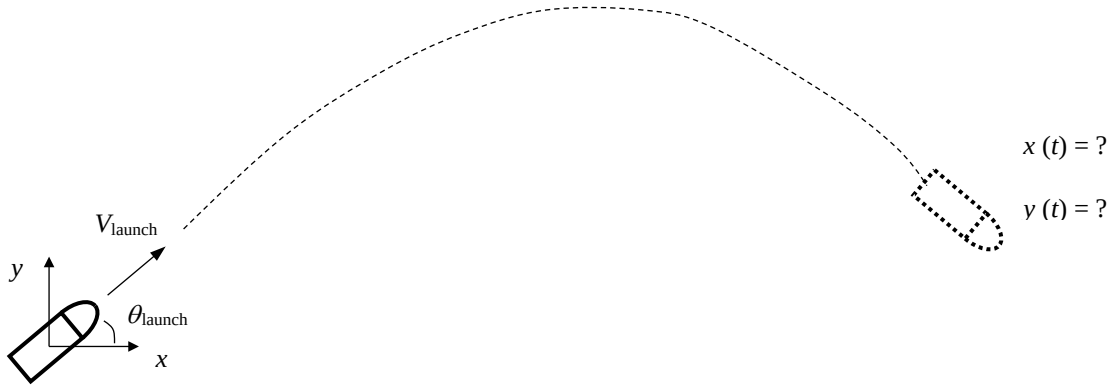
(over)

Write a script that:

- Uses a launch speed of 70 m/s and a gravitational acceleration of 9.81 m/s^2
- Calculates the rocket velocity and displacement 3 seconds after launch.
  ***Ans*:** $v(t = 3 \text{ sec}) = 40.6$ m/s and $y(t = 3 \text{ sec}) = 166$ m
- Prints the velocity and displacement to a text file along with appropriate words

Using the homework template, submit the code you typed in your script and the output to the text file.

Exercise 4. Let us extend the one-dimensional (vertical) rocket problem to two dimensions.



For a launch speed V_{launch} and a launch angle θ_{launch}, the relevant governing equations are

Initial horizontal velocity: $u_0 = V_{\text{launch}} \cos(\theta_{\text{launch}})$

Initial vertical velocity: $v_0 = V_{\text{launch}} \sin(\theta_{\text{launch}})$

Instantaneous horizontal displacement: $x(t) = u_0 \, t$

Instantaneous vertical displacement: $y(t) = v_0 \, t - \frac{1}{2} g \, t^2$

Instantaneous vertical velocity: $v(t) = v_0 - g \, t$

Write a script that:

- Uses a launch speed of 80 m/s, a launch angle of 50°, and a gravitational acceleration of 9.81 m/s^2
- Calculates the rocket x-position, y-position, and vertical velocity 5 seconds after launch
- Prints the answer to a text file along with appropriate words

Using the homework template, submit the code you typed in your script and the output to the text file.