

Project 3 FAQ

Important notes before FAQ:

- 1) Make sure you pass the format tests. Ensure that you compile your code on your local machine with the `-Wall` and `-Werror` flags as good programming practice.
- 2) Test your code for sample values from the project spec in an "init.txt" file. Use `ifstream` to read your input file, check if your outputs match the sample values.

3) Debugging Tips:

- a) While debugging your code, use print statements generously. Print out each variable and compare with manual calculations.
- b) For variables printed inside loops, print strings as markers to help you distinguish each iteration of the loop.
- c) Eg:

```
for (int i=0; i<10;i++){  
    cout << "Loop iteration: " << i <<endl  
    cout << var1 << endl;  
    //    Some operations here  
    cout << var2 << endl;  
}
```

- 4) **Remove all debugging statements** from your code before submitting it on autograder.io.

FAQ

- 1) What are the units of T , v_e , M_{total} and M_{fuel} in the init.txt file?
 - You can assume the units will be the same as those used in the table for Task 2.
- 2) My code doesn't seem to be printing anything, what should I do?

- Your loops may be running infinitely. Check your terminating condition, and verify the computation by printing out the values of variables within the loop.

3) The numbers I get are quite different from what I expect them to be. What should I check?

- Check your formulae. If you are not sure about any term in the formula, you can use the appendix at the bottom of the project spec as reference.
- Check your units. If units are not specified for quantities in an equation, assume the units previously used in the problem, e.g., for the following equation, h_n is in km, as previously defined.

$$\rho_n = 1.225 \times 10^6 \exp\left(-\frac{h_n}{9}\right)$$

- Check your loop terminating conditions.

4) How do I calculate the **maximum possible fuel** for the final task?

- There is a clue in the project spec for this:

You may search from a minimum fuel mass of zero up to the maximum fuel mass allowed by the equation for the velocity update:

$$v_{n+1} = v_n + \Delta t \left(\frac{T}{M_n} - g_n - \frac{1}{2M_n} \rho_n C_D A v_n^2 \right),$$

- for which $v_{n+1} > v_n$ on the first step or the rocket won't take off.
- The last line gives you exactly what condition the equation needs to satisfy in the first step, to get an upper limit on the fuel mass!

5) Am I checking for "rocket is too heavy" correctly?

- Note that the spec says the target height is 2000 km. So, if the rocket can't reach 2000 km, it's too heavy.