

Homework V : Introduction to C

Guidelines for Homework V : Please read carefully!

1. Homework V is due Friday, 14/12 by 20:00.
2. Homework will be submitted via email to `ustunel@metu.edu.tr`.
3. **VERY IMPORTANT!** The subject line of your email **MUST** read Phys343 Homework – nothing more, nothing less.
4. **VERY IMPORTANT!** Homework turned in between 20:00 on 14/12 and 08:00 on 15/12 will only receive 50% of the full credit. Homework turned in later than that will **NOT** be accepted.
5. I'm expecting a single `.c` file from you. Please do not send Word documents.

Goal of this assignment : In this assignment, you are going to practice converting `Octave` code into `C` code.

Question 1 (50 points) : Download the file `cannon_drag.m` and `interpolate.m` from the Web site. Convert these into a `C` program. You will write a single file `cannon_drag.c` where the `interpolate` function is going to be a subroutine. The input and output variable structure should be the same for `interpolate` meaning that it should take `x` and `y` coordinates of two points and should return the `x` coordinate of the intercept. The main code should print on the screen the angle with which the cannon ball hits the ground and the interpolated range. It should also store the trajectory (meaning `x` and `y` components of the trajectory) of the cannon ball in a file called `trajectory`. So the skeleton of your program should look like

```
#...
#...

double interpolate(double x1, double x2, double y1, double y2) {
    .
    .
    .
}
main() {
    .
    .
    .
}
```

When compiled and run, you should get something like this

```
hande@p439a:~$ ./cannon_drag
Initial velocity : ... m/sec    Initial angle : ... degrees
Final velocity : ... m/sec    Final angle : ... degress
```

where you may choose the format of the numbers as you like. In addition to this you should end up with a file called `trajectory`.

Hints :

1. Use a very small number such as `1.0e-16` instead of `eps`.
2. You do not need to fill in any arrays for this problem. Writing your results in a file is enough.
3. Because you are not filling in any arrays, it's important to store the positions and velocities from the step before within the `while` loop.
4. I am not asking for any plots.