

Name: _____

Problem	Points	Score
1	50	
2	30	
3	20	
Total	100	

Notes:

- (1) The first step in this exam is to create a workspace in the following directory:

`/data/courses/ece_1111/current/exams/exam_01`

Your directory should be your last name all lowercase, followed by an underscore, following by your first name (e.g, "picone_joseph"). Set the permissions using "chmod u+rw,g-rwx,o-rwx <lastname>" so only you have read and write permission to this directory. Create subdirectories within this directory: p01, p02, ... You will use these for problems 1, 2, ... respectively. Put ALL your code in these directories. Do not touch your files after the exam is over.

Failure to follow these instructions will result in a grade of 0. This preamble is part of the process of demonstrating you have basic Linux literacy.

- (2) Your code must be nicely formatted and well commented, or I will deduct at least 10 points per problem.
- (3) For this exam you are allowed to open a terminal window on your computer, you are allowed to web surf with Google, but you cannot use online chat or other interactive services.

Problem No. 1:

Consider the mathematical definition of a parabola:

$$x(t) = a1 * t^2 + a2 * t + a3$$

Write a program that prints out values of this function at specific points in time. Your interface should be:

```
p01.exe duration step_size a1 a2 a3
```

where t starts at zero and is incremented by $(i * step_size)$ until t exceeds the duration.

For example,

```
p01.exe 10.0 1.0 1.0 2.0 3.0
```

would print values of the above function for $t = 0, 1, \dots, 10$.

Be careful to compute t using $(i * step_size)$ rather than " $t += step_size$ " to avoid roundoff errors. Your loop should terminate when t exceeds the duration. Be sure to read the duration and $step_size$ from the command line using `atof()`.

Print values to stdout using the following format:

```
a1 = 100.0000
a2 = 200.0000
a3 = 20.0000
time = 0.0000 value = 0.0000
time = 1.0000 value = 275.1234
```

Use a make file, a header file and place your main program in a file *p01.cc*.

Problem No. 2: The directory tree:

```
/data/courses/ece_1111/current/resources/data/eeg_reports/v1.0/data/000/
```

contains 1000 files with an extension `*.txt`. Each filename has a basename in format `#####_s##.txt`. Write a Unix command that counts the number of files that have the number 4 in the 5th position of the first field (e.g., `00004999_s01.txt`) and a "9" in the last position before `_s_` (e.g., `00004999_s01.txt` satisfies this constraint, but `00004998_s03.txt` and `00005999_s01.txt` do not). Your Unix command can use pipes and filters but must be one line and not create any temporary files.

Place your command along with its output in *p02/p02.txt*.

Problem No. 3: The Unix command `date` returns the current date and time. Write a C program that reads the date from stdin and prints it out. The interface should be:

```
date | p03.exe
```

and should display the current date (e.g., `Wed Sep 23 08:51:17 EDT 2020`) returned by the `date` command.

Place your program, which should use a make file, a header file and a main program, in *p03* so that it compiles with `make`.