EECS 338 Homework 1: Using Linux and C

General requirements:

- See posted due date.
- Create a typed document (.txt or .pdf) with answers to the questions.
- Upload your document to Canvas.
- *Don't upload the program files this time, because I provided them. You do not need to modify them.*
- All work should be your own, as explained in the Academic Integrity policy from the syllabus.

Instructions: You are required to use the Linux command "top", but be aware that it may not work on your particular Linux environment (e.g. Mac). If your environment does not support the "top" as described in class, you should use one of the EECS virtual machines (eecslab-1.case.edu, etc.) as described in Tutorial #1. The four programs below are provided for you. Answer the questions that follow. Reasonable answers will receive full credit, based on information covered in class. Students are not expected to do extra research unless they wish to. The programs are:

- sleep.c
- input.c
- for.c
- while.c

Questions:

1. Briefly explain the difference between a program that is loaded into memory and a "process".

2. Use "top" while running all four programs simultaneously. Copy and paste the text from "top" to show what you saw (don't take a picture!). What do you see for %CPU and status 'S'? Provide a brief explanation for these results. Note: You may wish to use multiple terminal windows, as demonstrated in class, as well as running programs in the background (example: *./program* &).

3. Use "top" while running several instances of "for.c", such that the %CPU is less that 100%. Copy and paste the text from "top" to show what you saw. What do you see for %CPU? Provide a brief explanation for these results. Notes: The objective is to run more instances of the program than the number of available CPU cores.

4. Close all of your terminal window(s) without terminating the programs. Are they still running when you login again? Provide a possible explanation for what you find. Copy and paste the text from "top" to show what you saw. You may get different results depending on which OS you use for your terminal window (Mac vs. Windows vs. Linux). That's OK!

Tips:

- If you need the loop programs to run longer (for.c and while.c), you are allowed to increase the number of loop iterations to any value you wish.
- Most terminal windows have a way to highlight and copy the text. Learn how to copy/paste this text without copying the screen as an image. It's a useful technique.
- Remember to terminate instances of "input.c" when you are done. You may press 'k' in "top", followed by the PID.
- Sort by PID if you don't like the order to change (SHIFT-F for configuration screen, use up/down cursor to highlight PID, press 's' to select PID as sort field, and press 'q' or ESC to go back).