This first assignment will help you learn to use the Linux computers administered by OU Information Technology for the Gallogly College of Engineering. An account should have been set up for you automatically. If you have trouble accessing your account, then you MUST contact Dr. Neeman by no later than Wed Aug 31. You MUST be enrolled in CS1313 to get an account.

Actions and commands that you should perform or type are in the computer boldface font. Your user name is denoted here as yourusername, but will actually be your OU4+4 ID (the first 4 letters of your last name in all lower case, followed by a 4 digit number, which may be the last 4 digits of your OU ID number, depending on when you started at OU).

For each step in this project specification, you should do the following. IN THE FOLLOWING ORDER:

1. **READ** the full text of that step.
2. **DO** what the full text of that step says to do.
3. **ASK** questions about anything that’s unclear about that step.

**IMPORTANT! IMPORTANT! IMPORTANT! IMPORTANT! IMPORTANT! NEVER DELETE ANY FILE ASSOCIATED WITH CS1313, EVER!**

The requirements for this assignment are listed on the following pages.
I. LOG IN

1. Connect and log in, from a computer that you’re sitting at, to:

   ssh.ou.edu

   **NOTE:** ssh.ou.edu ISN’T a webpage, so you CANNOT access ssh.ou.edu from a web browser. Instead, you MUST follow the instructions below.

(a) **From a PC in Carson Engineering Center 205, 206 or S-18:**

   i. Press `Ctrl-Alt-Delete` simultaneously.
   ii. This will take you to the Logon Banner screen. Click the **OK** button, **OR** press the `Enter` key on the keyboard.
   iii. Type your OU4+4 username and password in the appropriate text boxes.
   iv. Click the `→` button, **OR** press the `Enter` key on the keyboard.
   v. Wait patiently while the PC logs you in and starts up various features.
   vi. Run a program named PuTTY, which lets you log in remotely to the computer that we’re going to use, as follows:

       A. On the bottom left of the screen, or on the main desktop, or in the Windows Start menu, click on the icon for your preferred web browser (for example, Firefox, Chrome, Microsoft Edge).
       B. In the web browser, go to the CS1313 website:
          http://cs1313.ou.edu/
       C. Scroll down almost to the bottom of the page, to the section titled USEFUL INFORMATION
       D. Click on the following link:
          Downloading a Secure Shell Client to Your Desktop
       E. Go to the link listed for PuTTY on that webpage.
       F. Under Alternative binary files specifically under putty.exe (the SSH and Telnet client itself) find the 64-bit x86 version and right-click on the link putty.exe
       G. Save putty.exe to your Windows desktop (or wherever you want it).
       H. Double-click on the PuTTY icon on your desktop (or wherever it’s saved).

vii. That’ll pop up a window titled PuTTY Configuration

On the left side of the window, under the heading Terminal, is an entry

**Keyboard**

Click on it.
viii. This will bring up a section titled
   Options controlling the effects of keys
   Under this is a heading
   Change the sequences sent by:
   and beneath that is
   The Backspace key
   Click to select
   Control-H

ix. A bit lower is
   The Function keys and keypad
   Click to select
   Xterm R6

x. On the left side of the PuTTY Configuration window, below
   Terminal
   and its subentries, is an entry
   Window
   Click on it.

xi. This will bring up a section titled
   Options controlling PuTTY’s window
   The first option is
   Set the size of the window
   Choose EXACTLY 80 columns wide (which is the default) and
   EXACTLY 40 rows high (which isn’t the default, so you’ll have to change it).

xii. Below that is an option
    When window is resized:
    Click on
    Forbid resizing completely
    NEVER RESIZE THE PUTTY WINDOW USING THE MOUSE, AND NEVER
    CLICK THE MAXIMIZE BUTTON AT THE TOP RIGHT OF THE WINDOW.

xiii. On the left side of the PuTTY Configuration window, below
    Window
    is a subentry
    Translation
    Click on it.

xiv. This will bring up a section titled
    Options controlling character set translation
    Below that is a section titled
    Character set translation
    and below that is a menu titled
    Remote character set:
    In that menu, select
    UTF-8
    (This may already have been selected by default.)
xv. On the left side of the PuTTY Configuration window, the fourth (and final) major entry is
  Connection
  Click on it.

xvi. This will bring up a section titled Options controlling the connection
    Below that is a section titled Sending of null packets to keep session active
    and below that is an item titled Seconds between keepalives (0 to turn off)
    In the text box on the right side of that line, set the value to 30

xvii. On the left side of the PuTTY Configuration window, the first entry is
  Session
  Click on it.

xviii. This will bring up a section titled Basic options for your PuTTY session
    The first option is Specify the destination you want to connect to
    and immediately below it is Host Name (or IP address)
    In the text box immediately below that, type the full name of the computer that
    you are logging into:
    ssh.ou.edu

xix. Immediately below this is Connection type:
    below which make sure that SSH
    is selected (it should be the default, so you shouldn’t need to click on it).

xx. At the bottom right of the PuTTY Configuration window, click

xxi. If a PuTTY Security Alert window pops up, click
  Accept

xxii. When prompted to login as, type your OU4+4 username with ALL LETTERS IN LOWER CASE (small), and then press Enter

xxiii. When prompted for your password, type your password (which should be your OU4+4 password, which DOESN’T have to be all lower case) and press Enter.

  NOTHING WILL APPEAR AS YOU TYPE YOUR PASSWORD.
  This is normal for Unix.

xxiv. NOTE: When you log out of a Windows PC in Carson 205, 206 or S-18, your PuTTY settings may be lost, in which case you’d have to redo all these settings each time.

xxv. Go to step I.2 on page 5.
(b) **From your own Windows PC, or from a Windows PC not in Carson 205, 206 or S-18:**

You will need to do steps I.1.a.vi-xxv, above.

If you’re on your own PC, you might want to save your PuTTY configuration. (On OU’s PCs, you might not be able to do that.)

(c) **From your own Apple MacOS or a Unix/Linux computer, or a Mac or Unix/Linux computer not in Carson 205, 206 or S-18:**

Go to the course website, scroll down nearly to the bottom, to the section titled “USEFUL INFORMATION,” and click on the following link:

**Downloading a Secure Shell Client to Your Desktop**

Go to the section on MacOS or Unix/Linux, and follow the instructions.

You should be able to access the command `ssh` from the Unix command line, like this:

```
ssh yourusername@ssh.ou.edu
```

where `yourusername` is your user name (that is, your OU4+4).

You should make sure that the terminal window is **EXACTLY** 80 columns wide by **EXACTLY** 40 rows high, so you may need to resize the terminal window to that size.

You should also make sure that the font is a fixed width font such as Courier New, so you may need to set that font.

2. If you cannot log in to `ssh.ou.edu`, try logging in to:

   `polk.ou.edu`

   It turns out that `ssh.ou.edu` is an alias for some PCs that are named for dead presidents: when you log in to `ssh.ou.edu`, you’ll actually get logged into one of these.

3. Once you log in, you’ll get some text, and then a Unix prompt — perhaps a greater-than sign, a percent sign or a dollar sign, maybe preceded by other text — with the text cursor after it, like so:

   `>`

   (In PuTTY, the text cursor will probably be green; other terminals may have other colors for the text cursor.)

If there is information before the prompt character, it might be the name of the computer that you’ve logged in to (which may be different from `ssh.ou.edu`), and/or your user name, and/or other information. For purposes of CS1313 course materials, we’ll generally use the greater-than sign `>` to indicate the Unix prompt.
4. Check the lines of text immediately above the Unix prompt. If there are lines of text something like this:

No directory /oushomes/Student/yourusername!
Logging in with home = "/".

then you should log out immediately by entering `exit` at the Unix prompt (you may have to do this twice to log out fully), and then log back in.

The same is true if there are lines of text something like this:

No directory /oushomes/FacStaff/yourusername!
Logging in with home = "/".

(This may happen if you are, or recently were, an OU employee.)

In which case, do as described just above.

5. Check to be sure that you’re in your home directory (a directory in Unix is like a folder in Windows, and your home directory in Unix is like your desktop in Windows):

```bash
> pwd
/oushomes/Student/yourusername
```

Or you might find that the output of the `pwd` command is:

```bash
/oushomes/FacStaff/yourusername
```

if you are, or recently were, an OU employee.

**NOTES:**

- All Unix commands **MUST** be followed by pressing the [Enter] key.
- **DON’T** type the greater than symbol `>`, which indicates the Unix prompt, and thus **ISN’T** part of the `pwd` command.

The `pwd` command is short for “Print working directory;” that is, “print the full name of the directory that I’m currently in.”

If your current working directory is just a slash (which means the root directory, which is like C:\ in Windows), rather than something like

```bash
/oushomes/Student/yourusername
```

then you should log out immediately by entering `exit` at the Unix prompt (you may have to do this twice to log out fully), and then log back in.

You may find that your home directory is something like:

```bash
/oushomes/FacStaff/yourusername
```

This is fine, and most likely is because you either currently work for OU or have worked for OU in the past.
II. SET UP (FIRST TIME LOGGING IN ONLY)

1. At the Unix prompt, type **EXACTLY** the bold text below, **EXCLUDING** the greater-than sign, which indicates the Unix prompt (all Unix commands **MUST** be followed by pressing Enter):

   ```
   > cp ~neem1883/DOT_student/.[a-z]* ~
   ```

   This command means: “Copy, from a subdirectory of Dr. Neeman’s home directory, specifically the subdirectory named DOT_student, all files whose filenames start with a dot (period .) followed by a lower case letter followed by any number of any characters, into my home directory.” You **WON’T** have to do this for future logins.

   **NOTICE:**
   
   • The Unix copy command is cp.
   • The first filename or directory name after cp is the source (the thing that you’re making a copy of); the second filename or directory name is the destination (the name and/or location of the copy).
   • Dr. Neeman’s account name on the IT Linux computers is neem1883, **NOT** hneeman.
   • In Unix, filenames are **case sensitive**, meaning that it matters whether you use upper case (capital) or lower case (small) for each letter in a filename.
   • In Unix, filename pieces are separated by slashes, **NOT** by backslashes as in Windows.
   • The symbol ~ (known as a tilde, pronounced “TILL-duh”) denotes your home directory (another way to denote your home directory is ~yourusername).
   • The substring ~neem1883 means “the home directory of the user named neem1883.”
   • If for some reason this doesn’t work, try
     ```
     cp /oushomes/FacStaff/neem1883/DOT_student/.[a-z]* ~
     ```

2. Enter the following command:

   ```
   > source ~/.profile
   ```

   This command means: “Execute the Unix commands that are in the file named .profile, which is in my home directory.” You **WON’T** have to do this for future logins.

3. Create a subdirectory named CS1313, like so:

   ```
   > mkdir CS1313
   ```

   **NOTICE:** In the subdirectory name CS1313, the CS **MUST BE CAPITALIZED**; that is, the directory’s name is “capital-C capital-S one three one three” with no spaces or other characters in between. This command means: “Create a directory named CS1313 as a subdirectory inside the directory that I’m currently in” (it’s like creating a new folder named CS1313 on your desktop in Windows). You **WON’T** have to do this for future logins.

4. Confirm that you have successfully created your CS1313 directory by listing the directory’s contents:

   ```
   > ls
   ```

   This command means: “List the names of the files and subdirectories in my current working directory.” **NOTICE** that the command is small-L small-S instead of one small-S, and that ls is short for “list.”
5. Set the permissions on your CS1313 directory so that only you can access it:
   > chmod u=rwx,go= CS1313
   This command means: “Change the mode (list of permissions) on my subdirectory named CS1313 so that I (the user) can read files in it, write files in it, and go into (execute) it, but nobody else can.” Your CS1313 directory is now accessible only to you. The only other people who can access it are the system administrators (sysadmins for short) of these computers; that is, IT staff. The instructor, the TAs and your CS1313 classmates CANNOT access your CS1313 subdirectory. You WON’T have to do this for future logins.

6. Log out of the Linux computer by entering exit at the Unix prompt (you may have to do this twice to log out fully). Once you have completed the setup steps in this section, you WON’T have to do them again when you log in later.
III. UNDERSTANDING SECURE SHELL

If you’ve got some confusion about what PuTTY or the Terminal are, here’s an analogy that may help.

Suppose I tell you that I want you to pick up some carrots off a counter and place them in a bowl. But, I want you to pick up a specific group of carrots from a specific counter, and place them into a specific bowl.

(For simplicity, let’s call them “my carrots,” “my counter” and “my bowl.”)

You could go home to your house/apartment/residence hall with a box of carrots and a bowl, and put your carrots into your bowl.

But the task I’ve assigned requires you to pick up my carrots from my counter and put them into my bowl.

So picking up your carrots off your counter and putting them into your bowl wouldn’t successfully complete the assignment: you need access to my carrots, my counter, and my bowl.

And no, you can’t come over to my house to do it.

But now suppose that I point you to an app that enables you to manipulate a robot in my kitchen that can pick up my carrots from my counter and put them into my bowl.

If you install that app (on your phone, tablet, PC, whatever) and then manipulate that robot to do that task, would you have properly completed the assignment?

Here’s an example, though not involving carrots:

https://www.youtube.com/watch?v=1bEaiADnxZc

In CS1313, we use a “Secure Shell client” app (for example, PuTTY, or the MacOS Terminal) to enter commands on ssh.ou.edu.

Note that ssh.ou.edu isn’t your PC, but instead is a couple of server computers in a data center somewhere on the OU Norman campus.

(Where they are physically doesn’t matter.)

Chances are that you’ll never physically see, let alone touch, ssh.ou.edu.

And you aren’t typing on the keyboard of ssh.ou.edu (there may not even be a keyboard for it).

Instead, you’re remotely accessing ssh.ou.edu and typing your Unix commands (and editing etc) on your local keyboard on your own PC (or one of the PCs in Carson 205, 206 or S-18), AS IF you were using the keyboard of ssh.ou.edu.

That is, you’re manipulating ssh.ou.edu remotely, via Secure Shell (ssh) login, for example through the PuTTY Secure Shell client app or a Terminal window.
IV. COPY PP#1 FILES FROM DR. NEEMAN’S HOME DIRECTORY TO YOURS

1. Log in again.

2. Check to be sure that you’re in your home directory:
   > pwd
   /oushomes/Student/yourusername

3. List the files in your home directory, especially to be sure that you have a CS1313 subdirectory in your home directory:
   > ls
   CS1313
   (There may be other files and subdirectories listed as well.)

4. Go into your CS1313 subdirectory:
   > cd CS1313
   This command means: “Change the working directory to CS1313, which is a subdirectory of the current working directory.” (This is like double-clicking on a folder icon in Windows.)
   NOTE: ALL CS1313 project files MUST reside in your CS1313 subdirectory, for this and ALL future programming projects.

5. Check to be sure that you’re in your CS1313 subdirectory:
   > pwd
   /oushomes/Student/yourusername/CS1313

6. List the files in your CS1313 subdirectory:
   > ls
   (There may be files and subdirectories listed.)

7. ASIDE: To learn more about a particular Unix command, type:
   > man commandname
   For example, try
   > man chmod
   which will give you the online manual page for the chmod command. The output of man goes through another command, more, which shows one screenful at a time. To get the next screenful, press the spacebar; to get the next line, press Enter. To quit more, press Q.

8. Copy the C source file named my_number.c from Dr. Neeman’s home directory into your CS1313 subdirectory:
   > cp ~neem1883/my_number.c .
   This command means: “Copy the C source file named my_number.c from Dr. Neeman’s home directory into the directory that I’m currently in.” NOTICE THE PERIOD at the end of this command; it means “the directory that I’m currently in” and is VERY IMPORTANT.

9. Confirm that you have my_number.c in your CS1313 directory by listing the directory’s contents:
   > ls
   my_number.c
   This command means: “List the names of the files and subdirectories in my current working directory.” NOTICE that the command is small-L small-S instead of one small-S, and that ls is short for “list.”
10. Copy the *makefile* named `makefile` from Dr. Neeman’s home directory into your 
CS1313 directory:
   
   ```
   > cp ~neem1883/makefile .
   ```
   Again, notice the period at the end of this command.

11. Confirm that you have `makefile` in your CS1313 directory by listing the directory’s 
contents:
   ```
   > ls
   makefile  my_number.c
   ```
   (There may be other files listed as well.)

12. **NOTE:** You **WON’T** do this kind of copying for future programming projects; in future you 
will write your own programs, typically starting from an empty C source file.
V. LOOK AT, MAKE (COMPILE) AND RUN THE ORIGINAL VERSION OF THE PROGRAM

1. If necessary, repeat IV.1-4, then definitely repeat IV.5-6.

2. For your own understanding, look at the contents of the C source file:
   
   ```bash
   > cat my_number.c
   ```

   This command means: “Output the contents of the text file named my_number.c to the terminal screen.” **NOTICE** that the command to output the contents of a text file to the terminal screen **without** using the more command is cat, which is short for “concatenate,” a word that means “output one text file after another in sequence.” The output of the cat command goes to the terminal screen, and in this case, we are only concatenating a single text file, so we’re simply outputting the text file’s contents to the terminal screen. If the contents of the file exceeds the height of the terminal window, then you can scroll up or down using the scrollbar on the right side of the window.

3. For your own understanding, look at the contents of the makefile:
   
   ```bash
   > cat makefile
   ```

4. **Make** (compile) the executable program for Dr. Neeman’s original version of my_number.c:
   
   ```bash
   > make my_number
   gcc -o my_number my_number.c
   ```

   **NOTICE:**
   
   • In the make command, the **command line argument** my_number is the name of the executable (the file that can actually be run) that you are making.
   
   • The make command runs the C compiler gcc to compile the C source file named my_number.c. In the compile command, the **command line option** -o my_number indicates that my_number is to be the name of the executable; that is, -o means “the output of the compiler,” and the output of a compiler is an executable. If that option had been left out, then by default the name of the executable would be a.out (“the output of the assembler”), **WHICH WOULD BE BAD.**
5. Once you have successfully compiled Dr. Neeman’s original version of the program, **RUN** the executable several times, using the following values as inputs, in this order:

   (a) an integer value less than 1;
   (b) an integer value greater than 10;
   (c) an integer value between 1 and 10 (inclusive), but far from 5;
   (d) an integer value close to 5 (within 1);
   (e) 5 (the correct value).

In Unix, you run an executable by entering the name of that executable at the Unix prompt:

```bash
> my_number
```

The sequence of runs will look similar to this:

```bash
> my_number
Let’s see whether you can guess the number that I’m thinking of.
It’s between 1 and 10.
What number am I thinking of?
0
Hey! That’s not between 1 and 10!
> my_number
Let’s see whether you can guess the number that I’m thinking of.
It’s between 1 and 10.
What number am I thinking of?
11
Hey! That’s not between 1 and 10!
> my_number
Let’s see whether you can guess the number that I’m thinking of.
It’s between 1 and 10.
What number am I thinking of?
2
Bzzzt! Not even close.
> my_number
Let’s see whether you can guess the number that I’m thinking of.
It’s between 1 and 10.
What number am I thinking of?
6
Close, but no cigar.
> my_number
Let’s see whether you can guess the number that I’m thinking of.
It’s between 1 and 10.
What number am I thinking of?
5
That’s amazing!
```
VI. EDIT THE C SOURCE FILE TO CREATE YOUR OWN UNIQUE VERSION

1. If necessary, repeat IV.1-4, then definitely repeat IV.5-6.

2. Now that you’ve run Dr. Neeman’s original version of the program, it’s time to modify your copy of the C source file my_number.c to create a version that’s uniquely yours. Using the text editor named nano, edit your copy of my_number.c:

> nano my_number.c

This command means: “Edit the text in the file named my_number.c that’s in my current working directory, using the text editor program named nano.” Your TA will be happy to help you learn how to use the nano text editor, and you can also find links on the CS1313 website to webpages describing how to use nano. These links are near the bottom of the page, in the section titled “Useful Information.”

**NOTE:** If you’d prefer to use another text editor (for example, vim, emacs), you may do so, but your TA won’t have time to help you learn it. **UNDER NO CIRCUMSTANCES SHOULD YOU EDIT A FILE ON A WINDOWS COMPUTER IF IT IS TO BE USED ON A UNIX/LINUX COMPUTER,** because Windows editors often embed invisible special characters in text files, and some Unix compilers choke on them.

3. In nano, notice the little help messages at the bottom of the screen:

```
^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Pg  ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where is  ^V Next Pg  ^U UnCut Text  ^T To Spell
```

For example, consider ^W Where is (the caret ^ indicates the Ctrl key) to search for a particular string of characters. Another example: ^C Cur Pos is short for “Cursor Position” and causes nano to tell you what line number the cursor is located at. Another example: ^K Cut Text means “delete the line that the cursor is currently on.”

4. Using the text editor, make the following changes to my_number.c:

(a) In the comment block at the top of the C source file, change the author name and e-mail address, and the lab information, so that they are your information.

(b) Save (see VI.5, below), exit nano (see VI.10, below), compile (see V.4, above), run (see V.5, above). This will test your first set of edits.

(c) In the declaration section, change the constant values that the following named constants are initialized to:

- minimum_number
- maximum_number
- close_distance
- computers_number

You may select any integer values that you want, as long as they are different from 1, 5, 10 and 1 respectively, and minimum_number < computers_number < maximum_number and they are sufficiently spread out that you can actually do the runs properly.

(For example, 2, 4, 2 and 3 won’t work, because anything close to 3 would be outside the range of 2 to 4.)

(d) Save, exit nano, compile, run. This will test your second set of edits.
(e) In the execution section (also known as the body of the program), change the following sequences of character text to your own words:

i. Hey!
ii. That’s amazing
iii. Close, but no cigar.
iv. Bzzzt! Not even close.

NOTE: You are welcome to say pretty much anything you want, but please avoid foul or inappropriate language. Please be entertaining; we’ll have a lot of these to grade.

(f) Save, exit nano, compile, run. This will test your final set of edits.

5. Every few minutes while you’re editing, you should save the work that you’ve done so far, in case your work is interrupted by a computer crashing. In nano, type [Ctrl]-O (the letter oh), at which point nano will ask you, near the bottom of the screen:

File Name to write: my_number.c

That is, nano wants to know what filename to save the edited text into, with a default filename of my_number.c. Press [Enter] to save to the default filename my_number.c.

6. A character string literal constant, also known as a character string literal or a string literal for short, is a sequence of characters between a pair of double quotes. For example, in the printf statement

```c
printf("This is a printf statement.\n");
```

the following is a string literal:

```c
"This is a printf statement."\n"
```

We say that the pair of double quotes delimits the sequence of characters in the string literal. Note that the \n at the end of the string literal tells the program to print a carriage return (also known as a newline) at the end of the line of output text.

7. The lines of text in the C source file my_number.c MUST be less than 80 characters long, and ideally no more than 72 characters long. (Your terminal window MUST be 80 columns wide.)

8. Some text editors, including nano, try to help keep text lines short, by breaking a long line into multiple short lines. For example, nano might break a line like

```c
printf("This is a long line and nano will probably break part of it off.\n");
```

into two separate lines:

```c
printf("This is a long line and nano will probably \\
break part of it off.\n");
```

That is, nano automatically puts a carriage return when the line starts getting too long for nano’s taste. Unfortunately, the C compiler will consider this to be an error. Why? Because C cannot allow an individual string literal to use more than one line. So, the correct way to write the above example is:

```c
printf("This is a long line and nano will probably");
printf(" break part of it off.\n");
```
9. Like the lines of C source text, the lines of output text **MUST** be less than 80 characters long, and ideally no more than 72 characters long. You can break a long line of output text into shorter pieces by making it into two printf statements. For example:

    printf("Why you big old stinker! That’s not between %d and %d\n", 
        minimum_number, maximum_number);

This single printf statement can be converted into two printf statements, like so:

    printf("Why you big old stinker! That’s not between\"");
    printf(" %d and %d\n", minimum_number, maximum_number);

10. After you’ve finished editing, exit the text editor. To do this in nano, type **[Ctrl]-X**. If you have made any changes since the last time you typed **[Ctrl]-O** then nano will ask you, near the bottom of the screen, **Save modified buffer (ANSWERING "No" WILL DESTROY CHANGES) ?**

    To save your most recent changes to the file (which is probably what you want to do), press the **Y** key; to avoid saving your most recent changes, press the **N** key. After that, nano will behave the same as if you had typed **[Ctrl]-O**.
VII. MAKE (COMPILE), RUN AND DEBUG YOUR OWN UNIQUE VERSION OF THE PROGRAM

1. If necessary, repeat IV.1-4, then definitely repeat IV.5-6.

2. Make (compile) your own unique version of the executable program:
   ```
   > make my_number
   gcc -o my_number my_number.c
   ```

3. If the program doesn’t compile, then you’ll need to edit it and figure out where things went wrong. **ALWAYS FIX THE FIRST ERROR FIRST** — often, some or all of the remaining error messages are side effects of the first error, and will disappear after you fix the first error. Once you’ve fixed an error, return to step VII.2, above.
   **NOTE:** EVERY SINGLE TIME you edit your C source file `my_number.c`, you should then IMMEDIATELY return to step VII.2, above.

4. In the worst case, if you’re totally stumped, then copy the original from Dr. Neeman’s home directory again (see IV.8), and start editing the fresh copy.

5. Once you have the program compiled, run `my_number` five times, using the following values as inputs, in this order:
   (a) an integer value less than your value for `minimum_number`
   (b) an integer value greater than your value for `maximum_number`
   (c) an integer value between your value for `minimum_number` and your value for `maximum_number` (inclusive), but far from your value for `computers_number`
   (d) an integer value close to your value for `computers_number` (that is, within your value for `close_distance` of your value for `computers_number`)
   (e) your value for `computers_number`

   It’ll look similar to the runs you did with Dr. Neeman’s original version of the program.

6. If the program doesn’t run, or if it runs incorrectly, then just as in Step VII.3 above you’ll need to edit it and figure out where things went wrong, and then return to step VII.2. Again, in the worst case, if you’re totally stumped, then copy the original from Dr. Neeman’s home directory again (see IV.8), and start editing the fresh copy.
VIII. CREATE A SCRIPT FILE

1. If necessary, repeat IV.1-4, then definitely repeat IV.5-6.

2. Once the program compiles and runs properly, then you’re ready to create a script file, which is a record of your interactions with the computer. Start the scripting session:

   > script ppl.txt
   Script started, file is ppl.txt

   Starting a scripting session is like turning on a tape recorder: every keystroke that you input (including backspaces) and every character that the computer outputs will be recorded into the script file, until you terminate the scripting session (see below).

   NOTICE: ppl.txt means “the text file that contains Programming Project #1.” Thus, the filename is small-P one dot small-T small-X small-T. Notice that the third character in the filename is the digit one, NOT lower case L.

   IMPORTANT: DON’T use the name of the executable in the name of the script file.

3. Print the working directory:

   > pwd
   /oushomes/Student/yourusername/CS1313

4. List the contents of the directory, using the long listing -l option:

   > ls -l
   -rwxr-xr-x 1 5013 100 13717 Aug 28 18:27 my_number
   -rw-r--r-- 1 5013 100 2976 Aug 28 19:10 my_number.c

   NOTICE that the command is:
   small-L small-S space hyphen small-L
   It is NOT NOT NOT small-L small-S space hyphen one
   which would be WRONG WRONG WRONG!!!

5. Output your makefile to the terminal screen:

   > cat makefile
   This command will cause the contents of makefile to be sent to the terminal screen, and also to be saved in ppl.txt, the script file.

6. Output your C source file to the terminal screen:

   > cat my_number.c
   As above, this command will cause the contents of my_number.c to be sent to the terminal screen, and also to be saved in ppl.txt, the script file.

7. IMPORTANT! IMPORTANT! IMPORTANT! IMPORTANT! IMPORTANT!
   Clean out any old executables:

   > make clean
   WARNING WARNING WARNING!!! If you don’t clean out your old executable, or if the compile command isn’t shown as a result of cleaning and then making, or if the compile command fails with error messages, then you haven’t proven that your program compiles properly, so YOU WILL LOSE UP TO HALF THE TOTAL VALUE OF THE PROJECT right off the top, before any deductions for mistakes are assessed by the grader.
8. **IMPORTANT! IMPORTANT! IMPORTANT! IMPORTANT! IMPORTANT!**

Make (compile) your executable program:

```
> make my_number
```

**WARNING WARNING WARNING!!!** If you don’t make your executable program, or if the compile command isn’t shown as a result of cleaning and then making, or if the compile command fails with error messages, then you haven’t proven that your program compiles properly, so **YOU WILL LOSE UP TO HALF THE TOTAL VALUE OF THE PROJECT** right off the top, before any deductions for mistakes are assessed by the grader.

9. Run `my_number`, using the same number of runs with the same input values in the same order as you used in your test in Step VII.5, above.

10. Terminate the scripting session:

```
> Ctrl-D
```

Script done, file is pp1.txt

This is like turning off the tape recorder.

11. You should now have a script file named `pp1.txt` that contains a complete record of the scripting session. Check to be sure that you have the file:

```
> ls
makefile my_number my_number.c pp1.txt
```

12. Enter the following command at the Unix prompt:

```
> dos2unix pp1.txt
```

This command will clear out some of the invisible special characters from `pp1.txt` (but unfortunately not all of them).

13. From this point on, you are **ABSOLUTELY FORBIDDEN** to alter your script file **IN ANY WAY, EVER.** This will be true for all future Programming Projects.

You’re welcome to create a new script file up until you submit the final version to Canvas (see below), using the exact same method as in this section. But, you’re **ABSOLUTELY FORBIDDEN** to edit (with a text editor such as `nano`) a script file that you’ve already created.

14. If you want to create a new script file, then:

   (a) If you’re currently in a scripting session, end the scripting session (see VIII.10, above).

   (b) Repeat steps VIII.2-10, above.

That is, the new scripting session will start by deleting the old script file (of the same file-name).

**NOTE**: It’s fine to create a new script file (as many times as you want), but once a script file has been created, it’s **ABSOLUTELY FORBIDDEN** to edit it in any way.
15. IMPORTANT IMPORTANT IMPORTANT IMPORTANT IMPORTANT IMPORTANT!
   Carefully PROOFREAD your script file, especially:

   - Did you do the following command?
     `pwd`
   - Did you do the following command?
     `ls -l`
     Especially, is it small-L, small-S, space, hyphen, small-L?
     Look CLOSELY at its output.
   - Did you do the following command?
     `cat makefile`
   - Did you do the following command?
     `cat my_number.c`
   - Did you do the following command?
     `make my_number`
     Especially, did you use the name of the executable, WITHOUT the `.c` extension?
     Was the output as follows?
     `gcc -o my_number my_number.c`
     Were there any error messages or warning messages?
   - Did you run the program the correct number of times, with the correct inputs, using the following command?
     `my_number`
IX. DOWNLOAD YOUR SCRIPT FILE AND YOUR C SOURCE FILE

— For a MacOS or Linux PC, go to the CS1313 website, scroll down to near the bottom to the section titled “Useful Information,” click on the link that says “Downloading to, or Printing a File from, a PC Not in Carson” and follow the instructions.

— For a Windows PC:

1. Use the same instructions as in I.1.a.vi.A-F on page 2 to download, to the Windows PC that you’re logged in to, the 64-bit version of psftp (instead of downloading PuTTY as you originally did).
2. Run psftp by double-clicking on its icon.
3. At the psftp prompt, enter:
   \texttt{open ssh.ou.edu}
4. You may be prompted to ask a Yes/No question, for example:
   \texttt{Store key in cache? (y/n)}
   If that happens, enter:
   \texttt{y}
5. At the login as prompt, enter your OU4+4 username.
6. At the password prompt, enter your OU4+4 password. \textbf{NOTHING WILL APPEAR AS YOU TYPE YOUR PASSWORD.} This is normal for Unix.
7. At the psftp prompt, enter:
   \texttt{pwd}
8. At the psftp prompt, enter:
   \texttt{ls}
9. At the psftp prompt, enter:
   \texttt{cd CS1313}
10. At the psftp prompt, enter:
    \texttt{pwd}
11. At the psftp prompt, enter:
    \texttt{ls}
12. At the psftp prompt, enter:
    \texttt{lcd C:\Users\yourusername\Desktop}
\textbf{NOTE:} The command is LOWER CASE LCD (small-L small-C small-D); the first character ISN’T a one. The command name is short for “local change directory,” where local means “on the PC you’re actually sitting at” (instead of the remote PC that you’re logged in to).
\textbf{ALERT:} The \texttt{lcd} command works in psftp (and other Secure File Transfer Protocol logins) \textbf{ONLY}, not in regular Unix SSH logins (for example, \texttt{lcd} \textbf{WON’T} work in a terminal window such as PuTTY).
\textbf{ALERT:} Your OU4+4 username will only work on the Windows PCs in Carson 205, 206 and S-18 (and perhaps on other OU-owned PCs on campus), but \textbf{NOT} on PCs elsewhere (especially, \textbf{NOT} on your personally owned PC). For example, on your personally owned Windows 10 PC, to find out your username, do as described on page 22.
13. At the psftp prompt, enter:
   `get pp1.txt`
   **NOTE:** The filename is LOWER CASE PP1.TXT (small-P small-P one period small-T small-X small-T); the third character is a one.
   **ALERT:** The `get` command, and its counterpart, `put`, work in psftp (and other Secure File Transfer Protocol logins) **ONLY**, not in regular Unix SSH logins.

14. At the psftp prompt, enter:
   `get my_number.c`

15. At the psftp prompt, enter:
   `exit`
   (Or, click on the little X in the upper right of the PSFTP window.)

16. On your Windows desktop, minimize all of the windows on your desktop, and find the icon for `pp1.txt` (which might just say `pp1`, with an icon showing several lines, representing lines of text, or a lizard on a piece of notebook paper with a pencil). If you can’t find the icon for `pp1.txt` on the desktop, then in the bottom left of the screen, click on the folder icon for File Explorer, and when the File Explorer folder opens, (double-)click on Desktop icon, and then you’ll see `pp1.txt` and `my_number.c`, though the extension after the dot might not be shown for one or both of those filenames.

**FINDING YOUR USERNAME ON A WINDOWS 10 PC:** As described in item IX.12, above, your OU4+4 won’t work on PCs not in Carson 205, 206 or S-18 (and perhaps other OU-owned PCs on campus). For example, if your personally owned PC has Windows 10, then you can find your username as follows:

1. Open any folder (or click on any open folder).
2. At the top of the folder window, click **View**
3. At the far left of the **View** pane that appears, click on **Navigation Pane**
4. In the popup menu that appears, make sure that **Navigation Pane** is checked.
5. In the navigation pane, click on **OS (C:)**
   OR
   **This PC**
   (It might be necessary to double-click, or single-click might work.)
6. If you clicked on **This PC**, then you may now need to (single- or double-) click on **OS (C:)**
   (or similar).
7. Find the folder named **Users**
   and double-click on it.
8. In the resulting list of folders, you should be able to identify your username on that PC.
X. WHAT TO SUBMIT: COVER SHEET, SUMMARY ESSAY, C SOURCE FILE, SCRIPT

1. COMPOSE the following items, using a word processor or text editor (you are ABSOLUTELY FORBIDDEN to submit these items written by hand):

   (a) A cover page with the following information:
      i. Project number and name
      ii. Course number, name, year and semester
      iii. Your name and e-mail address
      iv. Your lab section, day and time

   For example:
   Project #1: Thinking of a Number
   Class: CS 1313 010 Programming for Non-majors, Fall 2022
   Author: Kim Lee (kimlee@ou.edu)
   Lab: Section 014 Fridays 1:30pm
   NOTICE that this information is the same as in the comment block at the beginning of
   my_number.c.
   Your cover sheet MUST be named:
   pp1_cover.docx OR pp1_cover.doc OR pp1_cover.pdf

   (b) A summary essay about the project, in your own words.
   For each CS1313 programming project, the summary essay will be worth AT LEAST 10% OF THE PROJECT'S TOTAL VALUE (that is, a full letter grade) and MUST cover the following points, with a SECTION HEADER for each:
      i. The nature of the problem to be solved — typically a restatement, in your own
         words, of the description of the Programming Project that is found in the early
         paragraphs of the Programming Project specification.
      ii. An abstract description of the method of solving the problem you used — typically
         a description of how the program behaves, though in the case of PP#1 you may
         alternatively describe the method as following the steps in the PP#1 specification.
      iii. A list of the concrete steps by which you implemented your method (in the case
         of PP#1, you may list the major sections of the project)
      iv. The issues and problems that you had to address during implementation
      v. The concepts that you learned from this project
      vi. References as appropriate: EVERY summary essay MUST end with a clearly
         labeled references section, which may be marked “none” if there are no references.
   For PP#1, the summary MUST be at least half a page single spaced/full page double
   spaced, with a font of 10 to 12 points and margins of 3/4 inch to 1 inch on all sides.

   Your summary essay MUST be named:
   pp1_essay.docx OR pp1_essay.doc OR pp1_essay.pdf
2. You **MUST** upload **ALL** of the following to the PP#1 dropbox on OU’s Canvas website:
   - your cover page (in Word or PDF format)
   - your summary essay (in Word or PDF format)
   - your **C** source file *my_number.c*
   - your **script file** *pp1.txt*

(a) Using the Microsoft Edge web browser, go to:
   http://canvas.ou.edu/
   Note that other web browsers such as Firefox sometimes have problems with Canvas — you’re welcome to try another browser, but it might not work.

(b) Log in; your username will be your OU4+4, and your password will be the password for your OU4+4.

(c) Find and click on the link for
   **C S–1313–010 Fall 2022**
   You may need to click on the
   **Courses**
   button on the left side of the window, scroll down to the bottom of that menu, and click
   **All Courses**
   and then click on
   **C S–1313–010 Fall 2022**
   (or it might be listed as **CS1313** or similar).

(d) Near the left side of the page, in the vertical stack of words, click on
   **Assignments**
   If you don’t see that word, then at the bottom of that vertical stack of words, click on
   **New Analytics**
   and then click on
   **Assignments**

(e) You should see a list titled **Upcoming Assignments**; click on the assignment associated with the current Programming Project — in this case:
   **PP1**

(f) You’ll now be on the PP#1 page. On the right hand side of the window near the top will be a button labeled
   **Start Assignment**
   Click on it.

(g) This will cause to appear, a bit farther down the webpage, some tabs, one of which is:
   **File Upload**
   If it isn’t already selected, click on it.

(h) In the **File Upload** tab, click on:
   **Choose File**

(i) This will pop up an internal window titled
   **Open**
   On the left side of the **Open** window, click on:
   **Desktop**
(j) In the main panel of the Open window, double-click on:

my_number.c

The file may appear to be named my_number, so carefully inspect the little icon associated with the filename; if it’s a letter C, then that’s actually my_number.c. You can also look at the text to the right of the filename, which typically explains what kind of file it is — you want C Source.

NOTE: AVOID my_number.c~ (with a tilde after the .c), which is the next-to-last version of your C source file, NOT the final, compiled version that you want to upload.

(k) Once you’ve chosen the file, it’ll appear just to the right of the button labeled

Choose File

Below that, click on:

Add Another File

(l) Repeat the procedure above to find and add your script file:

pp1.txt

The file may appear to be named pp1, so carefully inspect the little icon associated the left of the filename; if it’s a little box with a bunch of horizontal lines, then that’s actually pp1.txt. You can also look at the text to the right of the filename, which typically explains what kind of file it is — you want Text Document.

NOTE: AVOID pp1.pdf if it’s there.

(m) Repeat the procedure above to find and add your cover page file:

pp1_cover.pdf OR pp1_cover.docx OR pp1_cover.doc

The file may appear to be named pp1_cover, so carefully inspect the little icon associated with the filename.

(n) Repeat the procedure above to find and add your summary essay file:

pp1_essay.pdf OR pp1_essay.docx OR pp1_essay.doc

The file may appear to be named pp1_essay, so carefully inspect the little icon associated with the filename.

(o) You DON’T need to write a comment in the comment box, but you’re welcome to.

(p) Click the button labeled

Submit Assignment

(q) If anything goes wrong, you can use the button labeled

New Attempt

in the upper right of the webpage.

(r) On the right hand side of the webpage (in your web browser), inspect the files that you’ve uploaded, to make sure that they’re the correct files, with EXACTLY the following filenames:

pp1_cover.pdf OR pp1_cover.docx OR pp1_cover.doc

pp1_essay.pdf OR pp1_essay.docx OR pp1_essay.doc

my_number.c

pp1.txt

(s) On the far left of the webpage, near the top, click on the button labeled

Account
Log out of Canvas by clicking the button labeled Logout

You will need to upload your cover sheet, your summary essay, your C source file and your script file for EVERY programming project in CS1313, unless otherwise announced.

XI. EXTRA CREDIT

HELP SESSION BONUS EXTRA CREDIT

You can receive an extra credit bonus of 5% of the total value of Programming Project #1 by doing the following:

1. Attend at least one CS1313 help session for at least 30 minutes, through Wed Sep 7.
2. During the help session that you attend, work on CS1313 assignments (ideally PP#1, but any CS1313 assignment is acceptable). YOU CANNOT GET EXTRA CREDIT IF YOU DON’T WORK ON CS1313 ASSIGNMENTS DURING THE HELP SESSION.
3. You may collect this extra credit bonus only ONCE for PP#1. That help session bonus will be worth an extra 5% of the value of PP#1.
COMMON PROBLEMS

- Case sensitivity: Unix and C are case sensitive.
- CS1313 subdirectory: ALL of your CS1313 work should be in your CS1313 subdirectory.
- The dot: Remember the dot at the end of some of the cp commands.
- ls: The command is small-L small-S NOT one small-S.
- ls -l: The command is small-L small-S space hyphen small-L NOT small-L small-S space hyphen one.
- Using Windows: UNDER NO CIRCUMSTANCES SHOULD YOU EDIT A FILE ON A WINDOWS COMPUTER IF IT IS TO BE USED ON A UNIX/LINUX COMPUTER.
- Constant values: In the declaration section of my_number.c, when you choose constant values, be sure that the values that you choose allow all of the runs. For example, don’t have the minimum and maximum too close to each other.
- What to change: In the execution section of my_number.c, be sure that the ONLY things you change are the ones specified. DON’T change anything else!
- Editing: Save your work frequently.
- Line lengths in C source code: In the execution section of my_number.c, be sure that each line is less than 80 characters long.
- String literals: In the execution section of my_number.c, be sure that each string literal is contained entirely on a single line.
- nano: When editing, if you see a line that ends in a dollar sign, probably that means that the line is too long. Also, be careful of nano putting in extra carriage returns.
- Running the program: Be sure that all outputs are less than 80 characters long.
- Script: Remember to make clean
  Failure to do so will cost you half the value of the project, right off the top.
- Script: Remember to make my_number
  Failure to do so will cost you half the value of the project, right off the top.
- make: The command is make my_number
  NOT make my_number.c
- Script: Be sure to do the correct number of runs, and in the correct order.
- PROOFREAD PROOFREAD PROOFREAD your script.
- Cover page: Be sure to list all required information.
- Summary essay: Be sure that it’s long enough.
- Summary essay: Be sure that you have a references section, even if you have no references.
- Upload: Be sure to upload the COVER SHEET file AND the SUMMARY ESSAY file AND the SOURCE file AND the SCRIPT file BUT NOT the executable file.
NOTES

READ THIS PROJECT SPECIFICATION SEVERAL TIMES, CAREFULLY. It is YOUR responsibility to read and comply with EVERY WORD. Failure to follow directions IN EVERY DETAIL will cost you a significant amount of points on this and all assignments. The fact that you didn’t notice something WON’T excuse you from complying with it.

You will use the same basic approach for every programming project in this course. Since your programming projects are 45% of your grade, each one may be worth half a letter grade or more. You’ll want to do them all, and to do them well.

For EVERY programming project, you are expected to keep a copy of your C source code and your script file on your IT Linux account THROUGH THE END OF THE SEMESTER until your overall letter grade for the course has been officially posted. NEVER DELETE EITHER FILE! If something goes wrong with your printout, these files will be your only proof that you’ve done the work. In addition, you may be assigned mini-projects that require you to modify a completed project; if you’ve deleted that project, then you may have to do the whole thing from scratch in a very limited amount of time.

We strongly recommend that you DON’T attempt extra, unrequested tasks on any assignment. While doing extra work is admirable in principle, in practice it creates a significant chance that you will be unable to complete the assignment on deadline. Unrequested extra work WON’T gain you extra credit. In some cases we may assign bonus work, which will be worth extra credit and which we encourage you to try; otherwise, it may be foolhardy to complicate a given assignment unnecessarily.

“The perfect is the enemy of the good.” If you have to choose between submitting an imperfect project on time or submitting a perfect project late, CHOOSE CAREFULLY. Remember that you lose the equivalent of TWO LETTER GRADES FOR EACH LECTURE PERIOD that your submission is late. If your program compiles and runs at all, even with errors, it will probably be wiser to submit it on time, rather than to continue to refine it and then submit it late, thereby accruing a lateness penalty.

To be a good programmer, you need the following:

- **Patience**
  Designing, writing and debugging programs takes a lot of time.

- **Persistence**
  Often, you will find yourself stuck without knowing how to proceed; DON’T give up.

- **Pessimism**
  – Just because you have a design, that doesn’t mean it’ll be easy to write the program.
  – Just because you’ve written the program, that doesn’t mean it’ll compile.
  – Just because it compiles, that doesn’t mean it’ll run.
  – Just because it runs, that doesn’t mean it’ll produce the correct answer.
  – Just because it produces the correct answer, that doesn’t mean that the printer works.

- **Practice**
  Just like writing prose, or welding, programming is learned by doing, not by theorizing.
SSH window size: In the window that I use to access ssh.ou.edu (for example, PowerShell or PuTTY in Microsoft Windows or the MacOS terminal window in MacOS), I always verify that my window size is EXACTLY 80 columns wide by EXACTLY 40 rows high (as described in the PP#1 specification, page 3, item I.1.a.xi and page 5, item I.1.c).

SSH window resizing FORBIDDEN (Microsoft Windows only): When I’m logging in to ssh.ou.edu from a Microsoft Windows PC via PuTTY, in the PuTTY window that I’m using, I always verify that I’ve set that window to forbid resizing (as described in the PP#1 specification, page 3, item I.1.a.xii).

Copying DOT_STUDENT files: I have successfully copied all of Dr. Neeman’s .[a-z]* files from his DOT_STUDENT subdirectory to my home directory (as described in the PP#1 specification, page 7, item II.1).

CS1313 subdirectory creation: I have successfully created my CS1313 subdirectory, using the mkdir command (as described in the PP#1 specification, page 7, item II.3).

CS1313 subdirectory permissions: I have successfully set the permissions on my CS1313 subdirectory to be limited to me only, using the chmod command (as described in the PP#1 specification, page 8, item II.5).

CS1313 subdirectory use: ALL of my PP#1 work is in my CS1313 subdirectory, and this will be true for ALL of my future CS1313 work (as described in the PP#1 specification, page 10, item IV.4).

Copy Dr. Neeman’s my_number.c: I successfully copied Dr. Neeman’s original C source file my_number.c to my CS1313 subdirectory (as described in the PP#1 specification, page 10, item IV.8).

Verify that my_number.c is in CS1313 subdirectory: I verified that I successfully copied Dr. Neeman’s original C source file my_number.c to my CS1313 subdirectory, by using the ls command (as described in the PP#1 specification, page 10, item IV.9).

Copy Dr. Neeman’s makefile: I successfully copied Dr. Neeman’s makefile to my CS1313 subdirectory (as described in the PP#1 specification, page 11, item IV.10).

Verify that makefile is in CS1313 subdirectory: I verified that I successfully copied Dr. Neeman’s makefile to my CS1313 subdirectory, by using the ls command (as described in the PP#1 specification, page 11, item IV.11).

Look at my_number.c: I examined Dr. Neeman’s original C source file, named my_number.c, using the cat command (as described in the PP#1 specification, page 12, item V.2).

Look at makefile: I examined my makefile using the cat command (as described in the PP#1 specification, page 12, item V.3).

Compile (make) Dr. Neeman’s my_number: I successfully compiled Dr. Neeman’s original C source file, named my_number.c, using the make my_number command (as described in the PP#1 specification, page 12, item V.4).

Run (execute) Dr. Neeman’s my_number executable: I successfully ran (executed) the executable made from Dr. Neeman’s original C source file, named my_number, using the my_number command, for all 5 runs, with the appropriate input values in the appropriate order (as described in the PP#1 specification, page 13, item V.5).
CHECKLIST ITEMS FOR CREATING AND TESTING YOUR OWN my_number.c

☐ Edit in Unix, NOT Windows: When editing the C source file to create my own version, I edited my C source file directly on ssh.ou.edu using a Unix text editor such as nano, NOT in Microsoft Windows using a Microsoft Windows editor (NOR in MacOS using a MacOS editor) (as described in the PP#1 specification, page 14, item VI.2).

☐ Comment block: In my version of the C source file my_number.c, in the comment block near the top of the C source file, before the main function, I changed the information to be my information (as described in the PP#1 specification, page 14, item VI.4.a).

☐ Constant values: In my version of the C source file my_number.c, in the declaration section, I chose new constant values for the named constants described in the PP#1 specification, and the values that I chose for these named constants are far enough from each other that all required test cases are valid and meaningful (as described in the PP#1 specification, page 14, item VI.4.c).

☐ String literals: In my version of the C source file my_number.c, in the execution section, I changed the text of the correct string literals, and I didn’t change the text of any other string literals not required in the PP#1 specification (as described in the PP#1 specification, page 15, item VI.4.e.i-iv).

☐ Saving regularly while editing: When editing my version of the C source file my_number.c (or any other file), I saved my work regularly and repeatedly (as described in the PP#1 specification, page 15, item VI.5).

☐ Line lengths in C source code: In my version of the C source file my_number.c, in the execution section, I verified that every line of C source code text is less than 80 characters long, the width of my terminal window (as described in the PP#1 specification, page 15, item VI.7).

☐ String literals: In my version of the C source file my_number.c, in the execution section, I verified that each string literal is contained entirely on a single line (as described in the PP#1 specification, page 15, item VI.8).

☐ Extra carriage returns/line breaks: In my version of the C source file my_number.c, throughout the entire file, I verified that there are no extra carriage returns/line breaks (as described in the PP#1 specification, page 15, item VI.8).

☐ Line lengths in output of runs: In my runs of my version of the C source file my_number.c, I verified that every line of output text is less than 80 characters long, the width of my terminal window (as described in the PP#1 specification, page 16, item VI.9).

☐ Compile (make) your my_number: I successfully compiled my version of the C source file named my_number.c, using the make my_number command (as described in the PP#1 specification, page 17, item VII.2).

☐ Run (execute) your my_number executable: I successfully ran (executed) the executable made from my version of the C source file, using the my_number command, for all 5 runs, with the appropriate input values in the appropriate order (as described in the PP#1 specification, page 17, item VII.5).
CHECKLIST ITEMS FOR SCRIPTING

☐ Start script session: I successfully started my scripting session, using the correct `script` command, with the correct filename, which for PP#1 is `pp1.txt` (small-P small-P one period small-T small-X small-T), NOT `ppl.txt` (small-P small-P small-L period small-T small-X small-T, which would be INCORRECT)
script pp1.txt
(as described in the PP#1 specification, page 18, item VIII.2).

☐ Script session `pwd`: In my scripting session, I properly did the `pwd` command (as described in the PP#1 specification, page 18, item VIII.3).

☐ Script session `ls -l`: In my scripting session, I properly did the `ls -l` command (small-L small-S space hyphen small-L, NOT small-L small-S space hyphen one, which would be INCORRECT) (as described in the PP#1 specification, page 18, item VIII.4).

☐ Script session `cat makefile`: In my scripting session, I properly did the `cat makefile` command (as described in the PP#1 specification, page 18, item VIII.5).

☐ Script session `cat my_number.c`: In my scripting session, I properly did the `cat my_number.c` command (as described in the PP#1 specification, page 18, item VIII.6).

☐ Script session `make clean`: In my scripting session, I properly did the `make clean` command (as described in the PP#1 specification, page 18, item VIII.7).

☐ Script session `make my_number`: In my scripting session, I properly did the `make my_number` command (as described in the PP#1 specification, page 19, item VIII.8).

☐ Script runs: In my scripting session, I did the correct number of runs, in the correct order, with appropriate values (as described in the PP#1 specification, page 19, item VIII.9 and page 17, item VII.5).

☐ Script session termination: In my scripting session, after completing the appropriate commands, I terminated the scripting session using `Ctrl-D`
(as described in the PP#1 specification, page 19, item VIII.10).

☐ Script file cleanup with `dos2unix`: After my scripting session, I cleaned up my script file `pp1.txt` using the `dos2unix pp1.txt` command (as described in the PP#1 specification, page 19, item VIII.12).

☐ Script file unedited: After cleaning up my script file `pp1.txt` using the `dos2unix` command, I NEVER edited or altered my script file `pp1.txt` in any way (as described in the PP#1 specification, page 19, item VIII.13).

☐ Script proofread: After finishing my script file `pp1.txt`, I thoroughly proofread my entire script file (as described in the PP#1 specification, page 20, item VIII.15).
CHECKLIST ITEMS FOR SUBMISSION

☐ Downloads: I downloaded my C source file and my script file to the PC that I wanted to upload to Canvas from (as described in the PP#1 specification, pages 21-22, items IX.1-16).

☐ Cover page: On my cover page, I verified that I have listed all of the required information, in the correct order (as described in the PP#1 specification, page 23, item X.1.a).

☐ Summary essay: In my summary essay, I verified that I have included all of the required sections and information, in the correct order (as described in the PP#1 specification, page 23, item X.1.b).

☐ Summary essay references section: In my summary essay, I verified that I have included a references section, even if I have no references (as described in the PP#1 specification, page 23, item X.1.b.vi).

☐ Summary essay long enough: My summary essay is at least a half page single spaced/full page double spaced (as described in the PP#1 specification, page 23, item X.1.b).

☐ Proofreading: Before submitting, I thoroughly PROOFREAD every part of my submission: my cover page, my summary essay, my script printout, this completed checklist, and optionally the bottom half of the completed bonus extra credit form if any.

☐ Upload: I uploaded, to the Canvas dropbox for PP#1, my COVER SHEET file, my SUMMARY ESSAY file, my C SOURCE file my_number.c AND my SCRIPT file pp1.txt BUT NOT my executable file nor any other file (as described in the PP#1 specification, pages 24-26, items X.2.a-t).

☐ Upload verification: I verified that I uploaded the correct files — and only the correct files — to the Canvas dropbox for PP#1.

☐ Files NEVER deleted: For the entire semester, I will NEVER delete my C source file nor my script file, even after this programming project is graded and returned to me.