Computing for Math and Stats

Lecture 6.

Input Output

- All programs need some form of input output
- We have seen some rudimentary kinds of both
- Need to input data
  - From the keyboard (mainly for testing/debugging)
  - From files
    - Spreasheet files
    - Other programs
    - Matlab (.mat) files
    - Measurement devices

Input Output

- We need to output to see the results of our labor (or Matlab's labor)
- We need to input data into Matlab to process them.
- Or to further process the data (by Matlab, spreadsheet, etc) by storing them on a file and retrieving them at a later time.
- Control some device (robot arm, 3-D printer, telescope, etc)

Very Simple Input

- When a script runs it has access to the variables we already defined
- Can be used for (trivial) input to a running script
- We will see far better ways to do things
  - That are less error prone
  - And require less typing

Keyboard input

- Mainly used for very simple programs
- And for debugging/testing
- It is normally too cumbersome

Simple Output

- Matlab has a simple output facility
  - Called disp
- Provides simple unformated output
- Gives slightly more control than omitting the semicolon

Formatted Output

- Matlab has a mechanism to provide formatted output
- Can be used for output to the screen or a file
- Follows the conventions (mostly) of C
- It is very flexible
- It comes in two flavors:
  - fprintf(formatstr, var1, var2, ...)
  - fprintf(fd, formatstr, var1, var2, ...)
- Where:
- Formatstr is a string that describes how things are printed
- Fd is a file descriptor (more on this later)
- Var1, var2, etc, are variables to be printed.

fprintf

- Can understand escape characters
- Follows the C/Unix/Linux tradition
- Uses
  - \n for new line
  - \t for tab
  - \b for backspace
- The first argument can be a file ID

Fopen, fclose

- We can open a file
  - Fopen returns a file descriptor.
- Write to it using fprintf
- Close it
- Use the file in another application or another day

fprintf

- Other conversion characters
  - E, e: exponential notation
  - f: fixed point notation
  - G, g: shortest of e, f
  - i, d : integer
  - s: string

fprintf

- The first argument is a format string (at least for now)
- The rest of the arguments depend on the formatting directives
- Directives start with % and end with a conversion character
  - %7.2f Floating point (real) with 7 characters, two after the dot
  - %-7.2f Same but left justified
  - %10d Ten digit decimal
  - %010d Same but with leading zeros
  - %+10d Always have the sign

fprintf

- fprintf can write to files
- To write to (or read from) a file we first have to open it
  - fd=fopen(‘myfileout’,’w’)
  - fprintf(fd,’format string...’,num1,num2...)
  - fclose(fd)
- If the first argument to fprintf is a file descriptor like fd, it prints to a file
- File descriptors are small integers.
- See prettyMatSOL.m