Review of Module 3

- The `stderr` output stream is for errors.
  - It is associated with the number 2.
  - `2>` directs `stderr` to a file.
  - `2>&1` merges `stderr` with `stdout`.
- Run a job in the background: `cmd &`
  - See jobs that are running: `jobs`
  - Kill a running job: `kill`
- Putting a foreground job in the background: `[Ctrl-Z] bg`
- Shell variables:
  - See with: `echo $var`
  - Set with: `var='some thing'`
- The shell is a program too.
  - A shell can be invoked by another shell.
  - By default, a variable is not exported to a sub-shell.
  - Export to all sub-shells: `export var`
- `$PATH` The order in which the shell looks for commands.

- Functions:
  - `function foo() {cmd1; cmd2; }`

- Arguments: `$1 $2` etc.

➢ Aliases
- `alias aname='cmd'`

➢ `~/.bashrc` can contain any variables, functions and aliases which will be loaded for any invocation of `bash`.

➢ Shell scripts:
- Begin with: `#!/bin/bash`
- Followed by any shell commands.
  - Lines beginning with `#` are comments except for the first line.
  - Blank lines are ignored.
- Make executable: `chmod +x file`

➢ Print: `lp file`
- `file` can be text or the language of the printer (i.e. PostScript).
- View queue: `lpq`
- Cancel: `cancel -P printer jobid`

➢ Remote access:
- Do not use `telnet` or `ftp`.
- Do use `ssh`, `scp`, and `sftp`.

➢ Regular Expressions:
- ^ Beginning of a line.

    - \^ A literal caret.
  - $ End of a line.
  - . (period) Any single character.
  - * Zero or more instances of previous character.
  - [...] The contents of the brackets.
    - [0-9] The range specified.
    - [^ ...] Not the contents of the brackets.
- sed – stream editor
  - sed 10q Quit after 10th line.
  - sed /re/q Quit after line containing the regular expression re
  - sed s/re/to/ Change first occurrence of re to to in each line.
  - sed s/re/to/g Change all occurrences of re to to.
  - sed -n /re/p Print only lines containing re.
- There are many utilities.

- awk instead of cut
  - awk ' { print $2, $3 } '

- Multiple whitespaces are a single field delimiter.
- The names of the fields are `$1, $2,` etc.