You are responsible for material covered in class sessions and homeworks; but, here's a quick overview of especially important material.

- You are permitted to bring into the exam a single piece of paper (8.5" by 11") on which you have handwritten whatever you wish on one or both sides. This paper must include your name, it must be handwritten by you, and it will not be returned.
  - Other than this piece of paper, the exam is closed-note, closed-book, and closed-computer.
- This exam will be similar in style to Exam 1, although most of the questions will focus on "new" material (material covered since Exam 1). However, concepts from Exam 1 will still be involved -- we have necessarily been building on earlier material.
- Remember that UNIX is case-sensitive; an answer may lose points if it uses the wrong case (VI and Vi are not legal UNIX commands, although vi is).
- Your studying should include careful study of posted examples and notes as well as the homeworks (and posted example solutions) thus far.

regular expressions

- You are responsible for being able to read, write, and understand both basic regular expressions (BREs) and extended regular expressions (EREs)
- You should be able to use regular expressions with the grep command, within a shell script with the =~ operator, and within sed scripts
- you were responsible for just simpler uses of grep on Exam 1 -- you should be comfortable with more in-depth use of it on this exam.

more bash shell features - especially good for interactive shells

- backquoting/command substitution
- environment variables and local variables
  - what is the scope/lifetime of each?
  - what environment variables does a subshell have? how does it get them? what is the impact on the calling shell if they are changed in a subshell?
- what does the source command do? why might one choose to use it?
- initialization files
  - how can you create command aliases in an initialization file? You should be able to read, write, and understand alias commands
- how can you set your bash command prompt?
• what does the PATH environment variable contain? How is it used? You should know how to reset this environment variable.

more bash shell features - especially good for bash shell scripts
• you should be able to read, write and understand both styles of for loops discussed (both "list-style" and "traditional")
• you should be able to read, write, and understand while loops
  – how can you read the lines from a file with a while loop?
• you should be able to read, write, and understand if statements
• you should be able to write a variety of tests (as can be used in while loops and if statements)
• how can you evaluate an arithmetic expression?
• you should be able to set and use local variables in bash shell scripts
• you should be able to write bash shell scripts that make use of command-line arguments
  – how can you find out the number of command-line arguments?
  – how can you get all of the command-line arguments? ...each individual command-line argument?
• how can you do interactive input in a bash shell script?
• how can you exit a shell script at a specific point? what is the significance of the value you exit with?
  how can you obtain the exit status of the previous command?
• you should be able to read, write, and understand bash arrays
  – you should be able to create an array, add array elements, modify array elements, access array elements
  – you should know how to find out how many elements are in an array
  – you should be able to obtain all of the indices for an array; you should be able to obtain all of the elements in an array
• you should be able to use the BASH_REMATCH array to obtain what matched a subexpression in a previous regular expression; you should be able to use it to obtain what matched that regular expression as well

more file-related topics and commands
• what do the commands basename and dirname return?
• what are device files? what is special about /dev/null? How is /dev/null often used?
• you should understand and be comfortable calling the following commands; you should know how they can be useful, when you might use them, and their effects and/or output when called:
  – cmp
– **diff** (including: what is the difference between **cmp** and **diff**?)
– **wc**
– **touch**
– **gzip, gunzip**
– **tar**
– **head**
– **tail**
– (and a few more **ls** command options)

**more commands**

- you should understand and be comfortable calling the following commands; you should know how they can be useful, when you might use them, and their effects and/or output when called:
  - **which**
  - **tee**

- you should be able to understand, read, and write **sed** commands involving basic substitution (either substituting for the first instance of a pattern in a line or for all instances of a pattern); more extensive use of **sed** and other **sed** commands will be final exam fodder.

**standard files and redirection**

- what is meant by the standard files standard input, standard output, and standard error?
- how can you redirect each?

**escaping special characters, and quoting**

- how can you escape special characters on the bash command line? within a command in a bash shell script?
- what is the difference between using single quotes and using double quotes when a shell variable is involved?

**the **find** command**

- you should be able to read, write, and understand how to use the **find** command
- criteria you should be comfortable with include **-name, -print, -type, -mtime, -size**
- in a number of **find**'s criteria, what is the difference between giving a number such as 3, +3, or −3?