These are the types of questions that you will find on the final exam. I have not included all possible topics, but I have included all possible types of questions. These questions have the same level of difficulty as you will find on the actual final exam.

1. A _____ is an operator that sends the standard output of one command to the standard input of another command.

2. The ___ is the part of the operating system that controls the hardware and software.

3. State four independent properties that a good password should have.

4. What is the difference between a relative and an absolute pathname?

5. Name four top-level directories that are always present in ANY UNIX system and describe their purpose in a few words:

6. From the following set of directory tables, it is possible to construct the tree and fill in the missing entries. Fill in the entries that are missing.

<table>
<thead>
<tr>
<th>288</th>
<th>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td></td>
</tr>
<tr>
<td>290</td>
<td>bar</td>
</tr>
<tr>
<td>100</td>
<td>stuff</td>
</tr>
<tr>
<td>389</td>
<td>.</td>
</tr>
<tr>
<td>100</td>
<td>data</td>
</tr>
<tr>
<td>402</td>
<td>c</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>288</td>
<td>.</td>
</tr>
<tr>
<td>387</td>
<td>dir1</td>
</tr>
<tr>
<td>389</td>
<td>dir2</td>
</tr>
<tr>
<td>387</td>
<td>.</td>
</tr>
<tr>
<td>100</td>
<td>.</td>
</tr>
<tr>
<td>402</td>
<td>x</td>
</tr>
</tbody>
</table>

7. Convert the following octal modes to permission strings.
   a. 0654 ____________________________
   b. 0753 ____________________________

8. Convert the following binary to decimal:
   10110110011 ____________________________

9. Convert the following decimal to binary:
   753 ____________________________
10. (2%) A ______ is a precise and unambiguous procedure for solving a problem in a finite number of steps.

11. (4%) If my umask is 022, what will be the permissions on the file created when I type the command `echo "hello" > newfile`?

12. (4%) What is displayed by the following command, given that thefile has the following contents:
   
   ```
   120 30 2030
   7530
   30 200 12
   10
   10 2.3005
   3
   ```
   
   ```
   $ cat thefile | grep '^[0-9]30' 
   ```

13. (4%) Write a regular (not extended) `grep` pattern that will find all input lines that end in a string of at least 8 alphanumeric characters.

14. (4%) Write a `grep` pattern that will match any decimal number less than 100.

15. (4%) What is output by the following Perl program?

   ```perl
   my $s = 0;
   my $i = 1;
   while ( $i <= 8 ) {
       $s = $s + $i;
       $i = $i + 1;
   }
   print "$s\n";
   ```

16. (4%) What is printed by the following code fragment:

   ```perl
   my $var = 10;
   my $ref = $var;
   my $newref = $ref;
   my $x = $$ref + 1;
   $var = $$newref - 2;
   print "\$ref = $ref and \$newref = $newref";
   ```

17. Write a function that returns its second argument concatenated to the end of its first argument.

18. Write the Perl instructions that reads words from standard input and create a hash named `wordlengths` that contains the words as keys and their lengths as values.