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 **pipe** is an operator that sends the standard output of one command to the standard input of another command.
2. The **kernel** is the part of the operating system that controls the hardware and software.
3. Name four different environment variables and state what data they contain. **Easy to look these up.**
4. What is the difference between a relative and an absolute pathname? **Absolute pathnames start at the root. Relative pathnames start in the current working directory.**
5. Name four top-level directories that are always present in ANY UNIX system and describe their purpose in a few words. **Look it up.**
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.

| | |
|---|---|
| 288 | . |
| | .. |
| 402 | foo |
| 290 | bar |
| 100 | stuff |

| | |
|---|---|
| **290** | . |
| 288 | .. |
| 387 | dir1 |
| 389 | dir2 |

| | |
|---|---|
| 389 | . |
| **290** | .. |
| 100 | data |
| 402 | c |

| | |
|---|---|
| 387 | . |
| **290** | .. |
| 402 | x |

7. Convert the following octal modes to permission strings.

   a. 0654 **rw-r-xr--**

   b. 0753 **rwxr-x-wx**

8. Convert the following binary to decimal:

   10110110011 **1459**

9. Convert the following decimal to binary:

   753 **1011110001**

10. (2%) An **algorithm** is a precise and unambiguous procedure for solving a problem in a finite number of steps.

11. (4%) Name three filters other than grep and describe what they filter. **Look up sed, awk, cut, head, tail, etc**

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'
    120  30  2030
    10 2.3005
```

**(because the 30 must be preceded by a non-digit.**

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.

```
\w\w\w\w\w\w\w\w$
```

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

```
[1-9][0-9]?   (did not mean fractional parts)
```

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

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

**The output is 36.**

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

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

**The output is $ref = some hex value and $newref = some hex value.**