Shell Topic 01: Basic Variable Usage

Note 1. Variables and quotation marks have subtle interactions in the shell, and these interactions are a common source of bugs. The dollar sign `$` is the *variable expansion operator*. Variable expansion does not happen within single quotes `'`, but does happen within double quotes `"` and backticks `` ` ``. Double quotation marks cause spaces to be ignored when determining arguments to an executable. Backticks cause the contents to be executed by a *subshell*. Backticks are equivalent to the *command expansion operator* `$()`.

Problem 2. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var="hello world"
$ touch $var
$ ls | wc -l
```

Fraction of LLMs with correct answer: 11 / 13 = 0.85

Problem 3. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var="hello world"
$ touch "$var"
$ ls
```

Fraction of LLMs with correct answer: 12 / 13 = 0.92

Problem 4. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var="hello world"
$ touch '$var'
$ ls
```

Fraction of LLMs with correct answer: 12 / 13 = 0.92

Problem 5. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=`echo hello world`
$ touch "$var"
$ ls | wc -l
```

Fraction of LLMs with correct answer: 13 / 13 = 1.00

Problem 6. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(echo hello world)
$ touch "$var"
$ ls | wc -l
```

Fraction of LLMs with correct answer: 13 / 13 = 1.00

Problem 7. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(echo echo echo)
$ touch "$var"
$ ls | wc -l
```

Fraction of LLMs with correct answer: 13 / 13 = 1.00

Problem 8. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var="$(echo echo echo)"
$ touch "$var"
$ ls
```

Fraction of LLMs with correct answer: 8 / 13 = 0.62

Problem 9. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var='$(echo echo echo)'
$ touch "$var"
$ ls
```

Fraction of LLMs with correct answer: 11 / 13 = 0.85

Problem 10. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(echo $(echo echo))
$ touch "$var"
$ ls | wc -l
```

Fraction of LLMs with correct answer: 13 / 13 = 1.00

Problem 11. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(echo '$(echo echo)')
$ touch "$var"
$ ls
```

Fraction of LLMs with correct answer: 11 / 13 = 0.85

Problem 12. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(echo $(echo $(echo)))
$ touch "$var"
$ ls | wc -l
```

Fraction of LLMs with correct answer: 8 / 13 = 0.62

Problem 13. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(echo $(echo) echo)
$ touch "$var"
$ ls | wc -l
```

Fraction of LLMs with correct answer: 12 / 13 = 0.92

Note 14. The syntax for quotation marks is more flexible in the shell than most other languages.

Problem 15. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=hello
$ touch "$var"world
$ touch ${var}world
$ touch $varworld
$ touch $var world
$ ls
```

Fraction of LLMs with correct answer: 5 / 13 = 0.38

Problem 16. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var="hello world"
$ touch "$(echo "$var")"
$ ls
```

Fraction of LLMs with correct answer: 13 / 13 = 1.00

Problem 17. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var="hello world"
$ touch "$(echo '$var')"
$ ls
```

Fraction of LLMs with correct answer: 12 / 13 = 0.92

Problem 18. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(echo '$(echo 'echo')')
$ touch "$(echo '$var')"
$ ls
```

Fraction of LLMs with correct answer: 10 / 13 = 0.77

Note 19. Variables get expanded before determining the arguments to executables, and so if a variable has a space then it will result in multiple arguments. If a variable has newlines, those newlines will get removed if the variable is not quoted.

Problem 20. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(cat <<EOF
hello world
hola mundo
salve munde
EOF
$ )
$ echo $var | wc -l
```

Fraction of LLMs with correct answer: 11 / 13 = 0.85

Problem 21. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(cat <<EOF
hello world
hola mundo
salve munde
EOF
$ )
$ echo "$var" | wc -l
```

Fraction of LLMs with correct answer: 11 / 13 = 0.85

Problem 22. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(cat <<EOF
hello world
hola mundo
salve munde
EOF
$ )
$ echo $var | grep 'h' | wc -l
```

Fraction of LLMs with correct answer: 9 / 13 = 0.69

Problem 23. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ var=$(cat <<EOF
hello world
hola mundo
salve munde
EOF
$ )
$ echo "$var" | grep 'h' | wc -l
```

Fraction of LLMs with correct answer: 12 / 13 = 0.92

Note 24. By default, variable expansion happens within heredocs. If the heredoc termination string is surrounded in single quotation marks, then variable substitution will not occur.

Problem 25. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ place=world
$ var=$(cat <<EOF
hello $place
hola $place
salve $place
EOF
$ )
$ echo "$var" | grep 'e' | wc -l
```

Fraction of LLMs with correct answer: 11 / 13 = 0.85

Problem 26. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ place=world
$ var=$(cat <<'EOF'
hello $place
hola $place
salve $place
EOF
$ )
$ echo "$var" | grep 'e' | wc -l
```

Fraction of LLMs with correct answer: 6 / 13 = 0.46

Problem 27. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ place=world
$ var=$(cat <<'EOF'
hello $place
hola $place
salve $place
EOF
$ )
$ echo "$var" | grep '$greeting' | wc -l
```

Fraction of LLMs with correct answer: 13 / 13 = 1.00

Problem 28. Write the output of the final command in the following shell script.

```
$ cd; rm -rf quiz; mkdir quiz; cd quiz
$ place=world
$ var=$(cat <<EOF
hello $place
hola $place
salve $place
EOF
$ )
$ echo $var | grep "$greeting" | wc -l
```

Fraction of LLMs with correct answer: 6 / 13 = 0.46

LLM Model Performance