

Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page. The exam has 4 questions with equal weight. Some questions have multiple parts. Point totals are given in the margin.

Name: _____ **Answer Key** _____

1. _____ **25**

2. _____ **25**

3. _____ **25**

4. _____ **25**

Total _____ **100**

No notes or books may be used on the exam. If you have any questions, please raise your hand and I will try to answer them.

1. Answer the following questions regarding SED:

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(a) Write a SED script that deletes all non-blank lines from its input.

Answer:

```
/^$/!d
```

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(b) Write a shell script, called `escape`, that uses `sed` to copy its first argument to standard output but with the following metacharacters escaped by a backslash: `. * ^ $`. For example:

```
$ escape 'hello'
hello
$ escape 'phrase.with*meta.characters^embedded'
phrase\.with\*meta\.characters\^embedded
```

Answer:

```
#!/bin/sh
```

```
echo "$1" | sed 's/[.*^$]/\&/g'
```

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(c) Write a shell script, called `header`, that uses `sed` to replace the first line of the file given as the first argument of the script with the value of the second argument. For example:

```
$ cat file
line 1
line 2
line 3
$ header file 'This is a test'
$ cat file
This is a test
line 2
line 3
```

Answer:

```
#!/bin/sh
```

```
echo "$2" > tmp
sed 1d "$1" >> tmp
mv tmp "$1"
```

2. Write an AWK script or shell script that uses awk to solve each of the following problems:

```
18076 Mikkilineni 8 MWF 10:30 11:35 Introduction to Computing
18124 Atkinson 174 TR 11:50 13:35 Software Engineering
18077 Mikkilineni 8 TR 08:00 09:45 Introduction to Computing
18121 Ling 122 MWF 09:15 10:20 Computer Architecture
18127 Noll 176 MWF 10:30 11:35 Software Tools Design
18130 Li 177 TR 08:00 09:45 Operating Systems
18965 Figueira 146 TR 09:55 11:40 Computer Networks
18133 Holliday 178 TR 09:55 11:40 Introduction to Database Systems
```

5 (a) Write the section numbers of all upper division classes.

Answer:

```
$3 >= 100 {print $1}
```

5 (b) Write (in any order) the number of classes taught by each instructor.

Answer:

```
{count [$2] ++} END {for (name in count) printf "%s: %d\n", name, count [name];}
```

5 (c) Write data for all classes that start before 10:00 AM.

Answer:

```
$5 ~ /^0/
```

5 (d) Write the section number and title (on a single line) of each course.

Answer:

```
{printf "%s", $1; for (i = 7; i <= NF; i++) printf " %s", $i; printf "\n"}
```

5 (e) Write data for all MWF classes, sorted by course number.

Answer:

```
#!/bin/sh
```

```
awk '$4 == "MWF"' | sort +2 -n
```

3. Answer the following questions regarding RCS and DIFF:

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(a) Identify the following statements as True (T) or False (F):

- i. F RCS is implemented using CVS.
- ii. T RCS is implemented using DIFF.
- iii. F RCS is implemented using SED.
- iv. F SED is implemented using AWK.
- v. T DIFF produces output for ED.

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(b) SCCS and RCS both store the differences between versions rather than storing each version in its entirety. What is the advantage of this approach?

Answer: Typically, the changes made to a file are small relative to the size of the file. Therefore, the differences between the changed file and the original file require less space than storing the entire file anew. Furthermore, versions can be constructed quickly from the differences, since the differences are small.

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(c) SCCS stores the original version of the file and all *forward* differences, which it then uses to construct the subsequent revisions. RCS stores the current version of the file and all *backward* differences, which it then uses to construct the earlier revisions. How is the design used by RCS better?

Answer: Since users typically work forward and make changes on the current version of a file (or perhaps on a few previous versions), RCS can usually retrieve a version faster than SCCS.

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(d) Briefly describe two problems in software engineering that RCS was designed to solve.

Answer:

- Multiple users making simultaneous changes to the same file.
- Retrieving earlier versions of a file.
- Maintaining a history of changes to a file.
- Merging revisions.
- Identifying change information such as author and date.

4. Answer the following questions related to web-based tool design:

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(a) Identify the following applications as best suited to an Applet (A) or a Form (F):

- i. F Online book ordering
- ii. A Real-time stock market quotes
- iii. A Internet bridge game
- iv. A Solitaire game
- v. F Internet course registration for a University

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(b) What is an advantage of using the GET method of HTTP? How are the parameters (form data) made available to the server application (e.g., CGI script)?

Answer: Pages accessed using GET can be bookmarked. The parameters are encoded and made available through the environment variable `QUERY_STRING`.

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(c) What is an advantage of using the POST method of HTTP? How are the parameters (form data) made available to the server application (e.g., CGI script)?

Answer: Pages accessed using POST are more secure since any sensitive data is not encoded in the URL and logged in the browser's history. The parameters are encoded and made available as standard input to the server application.

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(d) Downloading and executing an applet is considered safe. Why is this? Be specific.

Answer: Since an applet consists of bytecode and is not a direct executable, the Java Virtual Machine (JVM) must perform all operations for it. Therefore, the JVM can limit the capabilities of an applet, as it can any Java program. The JVM lets an applet draw in its own window and communicate with the server from which it was downloaded. Specifically, an applet cannot read or write files on the client machine.