



CSCI 2132 Midterm 1 Solutions

Term: Fall 2018 (Sep4-Dec4)

1. (8 points) **True-false questions:** 2 points each. No justification necessary.

a) (2 points) In Unix, the kernel allocates time and memory to processes. True or false?

Solution: True. (One of the functions of the kernel is to allocate time and memory to processes.)

b) (2 points) The Unix command `cd` is an external command. True or false?

Solution: False. (It is an internal command, or built-in command.)

c) (2 points) The `fork` system call is used to create new hard links to a file. True or false?

Solution: False. (The `fork` system call is used to create new processes.)

d) (2 points) During linking phase of C program compilation, machine code from libraries is integrated with the code generated from the source program into an executable program. True or false?

Solution: True.

2. (9 points) **Multiple-choice.** No justification necessary. Circle the *single* best answer.

a) (3 points) A user created a directory named `dir1`. He entered the command `ls -ld foo` and the first field of the output is `drw-r---x`. He would like to execute a command to change the permissions of `dir1`, so that when entering the command `ls -ld dir1` again, the first field of the output will be `drwxr--r--`.

Which one of the following four command will complete this task correctly?

- A. `chmod u+x,g+x dir1`
- B. `chmod u+r+x,o+r dir1`
- C. `chmod a+r-x dir1`
- D. `chmod 744 dir1`

Solution: D.

b) (3 points) A file `names` contains people names. Each line contains a first name and a last name of a person (e.g. `John Smith`), and the file is not sorted. Our task is to list only first names, sorted alphabetically, and no name should be repeated in more than one line.

Which one of the following four command will complete this task correctly?

- A. `cut -d " " -f 1 < names | uniq | sort`
- B. `cat names | cut -d " " -f 1 | sort | uniq`
- C. `sort | uniq | cut -d " " -f 1 names`
- D. `sort < names | uniq | cut -d " " -f 1`

Solution: B.

c) (3 points) Which SVN command can generate conflict between our and somebody else's changes to the files?

- A. `svn checkout`
- B. `svn update`
- C. `svn commit`
- D. `svn resolved`

Solution: B. `svn update`

3. (9 points) Give concise answers.

a) (4 points) Briefly explain relation between inodes and soft and hard links.

Solution: Inodes are numbers identifying files. Any files that are hard-linked share the same inode number, while files connected by soft links do not share inode numbers.

b) (5 points) Consider the following code snippet:

```
int i, j, k;    float x, y;
scanf("%d%f%d%f%d", &i, &x, &j, &y, &k);
```

Assume that the user input for the `scanf` function in this snippet is

```
23 .3e5 12.4e1-2.31 12
```

Write down the values of `i`, `j`, `k`, `x` and `y` after this `scanf` call is executed. If a variable is not assigned, mark its value with a question mark.

Solution:

- `i`: 23
- `j`: 12
- `k`: -2
- `x`: .3e5 (or 30000.0)
- `y`: .4e1 (or 4.0)

4. (12 points) **Command line.** For each of the following questions write a single command line to perform the required task. You do not need to justify the answer. You are allowed to use only the following commands, with possible pipes: `cat`, `cut`, `echo`, `grep`, `ls`, `sort`, `uniq`, and `wc`.

a) (4 points) Print the number of files in the directory `/var/log` whose name starts with an uppercase letter and ends with two digits. An example of such filename would be `/var/log/C-file.27`

Note that you are asked to print the number of such files.

Solution:

```
ls /var/log/[A-Z]*[0-9][0-9] | wc -l
```

b) (4 points) Print out all lines from a file named `file.txt`, that contain the word `alpha` or `Alpha` two times. The word must appear in lowercase letters and not inside a larger word, like `alphabet`. (Note: remember that `grep` word-boundary anchor is `\b`.)

Solution:

```
grep '\b[Aa]lpha\b.*\b[Aa]lpha\b' file.txt
```

c) (4 points) You are given a file named `phonebook.txt`, which contains a list in the following format:

```
John,Doe,902-123-4567,john@dal.ca
```

```
Jennifer,Davis,902-234-5678,jen@dal.ca
```

```
Alice,Garcia,416-321-7654,alice@gmail.com
```

... and so on. The fields in each line are separated by commas. The third field is phone number and digits before the first hyphen (-) in the phone number is the area code. Write a command that prints all area codes in sorted alphabetical order without repetitions.

Solution:

```
cut -d, -f3 phonebook.txt | cut -d- -f1 | sort | uniq
```

or

```
cut -d, -f3 < phonebook.txt | cut -d- -f1 | sort | uniq
```

5. (10 points) C Program.

(10 marks) Write a C program that reads an integer i and a floating point number x separated by a space. (Don't print anything at this point.) You can use either float or double for the floating-point number. The integer i is a code:

- if i is 0, then x the number of pounds and you need to convert them to kilograms using formula $x/2.20462$,
- if i is not 0, then x is the number of kilograms and you need to convert them to pounds using formula $x * 2.20462$.

For example if $x = 3.5$ then the output of the program is either (when i is 0):

3.50 lb = 1.59 kg

or

3.50 kg = 7.72 lb

depending on i . The numbers in the output must be printed with the precision of 2 digits, and the output must look as described above. Define number 2.20462 as a constant.

Solution:

```
#include <stdio.h>

#define LBperKG 2.20462

int main() {
    int i;
    double x;
    scanf("%d%lf", &i, &x);
    if (i==0)
        printf("%.2lf lb = %.2lf kg\n", x, x / LBperKG);
    else
        printf("%.2lf kg = %.2lf lb\n", x, x * LBperKG);
    return 0;
}
```