

# CSc 3320: Systems Programming

Spring 2021

Homework

# 1: Total points 100

## Submission instructions:

1. Create a Google doc for each homework assignment submission.
2. Start your responses from page 2 of the document and copy these instructions on page 1.
3. Fill in your name, campus ID and panther # in the fields provided. If this information is missing in your document TWO POINTS WILL BE DEDUCTED per submission.
4. Keep this page 1 intact on all your submissions. If this *submissions instructions* page is missing in your submission TWO POINTS WILL BE DEDUCTED per submission.
5. Each homework will typically have 2-3 PARTS, where each PART focuses on specific topic(s).
6. Start your responses to each PART on a new page.
7. If you are being asked to write code copy the code into a separate txt file and submit that as well.
8. If you are being asked to test code or run specific commands or scripts, provide the evidence of your outputs through a screenshot and copy the same into the document.
9. Upon completion, download a .PDF version of the document and submit the same.

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## PART 1

Answer the following questions briefly. Provide clear and succinct reasoning.

Points per question = 5

1. Tell the differences between Unix and Linux. Then please list some operating systems (at least three) which belong to Unix but not Linux.

Linux is an operating system that behaves a lot like UNIX. Linux is also written by many programmers and marketed all over the world. Linux is basically a complete Reimplementation of UNIX. Unix was Developed by AT&T Bell Labs's Ken Thompson. It's also not truly open source. Many manufacturers have their own versions for different devices

2. What is the pipe mechanism in UNIX? And show one command using pipe and explain how the pipe works in it?

The pipe is an interprocess communication medium. It's essentially a one way data channel that allows two processes on the same machine to communicate.

```
ls | wc -l
```

In this example, the command **ls** lists the files , then uses the output from that list as **wc**'s input in order to count the lines.

3. In a Linux system, you can issue the command **ls /** to check the sub directories under root. Please describe the meanings of directory **/bin**, **/dev**, **/boot**, **/usr**, **/etc**, **/mnt**, **/sbin**, **/var** separately. For example, you can say that **/bin** contains binary executable files.

/bin: contains binary executables

/dev: contains the device files

/boot: contains files required for booting

/usr: Stands for UNIX System Resources. Does NOT stand for "user". Inherited from earlier UNIXes

/etc: Et cetera. The spot to put config-files. Inherited from earlier UNIXes

/mnt: Where temporary file-systems are mounted

/sbin: where super-binaries are stored.

/var: Inherited from earlier UNIXes, stands for variable. Where system data that varies would be stored. Things like caches are located here.

#### **4. What is the meaning of Multitask and Multi-user in a Unix system?**

UNIX is able to successfully manage and handle more than one user at one time. It also can successfully allocate enough data, memory, and resources to handle multiple processes in an appropriate amount of time.

#### **5. What does -rwxr-xr-x mean in terms of permissions for a file? What is the exact unix command (with the octal representation) for changing the permissions to this setting?**

User has permissions to read, write and execute, the group can read and write, and others can only read and write as well.

The command: `chmod 750` .

**6. In class, you have learned the meaning of read, write and execute permission for regular files. However, these permissions are also applied to directories. So please describe the meaning of read, write, and execute permission for directory.**

Read: Read permissions allow you to read the directory and list the names of the files it contains, but nothing else .

Write: Write allows the user to add files.

Execute: This means the process can access files in the directory or any of its subdirectories.

## **Part II-a**

### **Regular Expression**

**Find outcomes for each given basic/extended regular expression (maybe multiple correct answers) and describe the pattern of matched string for 3), 4), 5), 6), 11).**

**Points per question: 2.5**

*Example:*

*'ab+a' (extended regex)*

*a) ababa b) aba c)abba d)aabbaa e)aa*

**Answer:** *b,c ; Pattern : The matched string should begin and end with 'a' and 'b' occurs at least once between leading and ending 'a')*

Note: 7) to 10) are basic regexes; Note: 11) to 18) are extended regexes.

7) 'a[ab]\*a'                      *aaa or ab or aba* Pattern: The matched string should begin with a , and follow with either a or b, and then follow with either 0-however many a's

8) 'a(bc)?'                      *abc or abcs* Pattern: The matched string should begin with a , and follow with bc and either an s or nothing

9) '[ind]\*'                      *ai or bn* Pattern: Whatever character followed by either i, n , or d.

10) '[a-z]+[a-z]'                      *ad or hs or rd* Pattern: any letter from a to z alongside any letter from a-z

11) '[a-z] (\+[a-z])+'                      **Pattern: any letter from a to z,**

**followed by any letter from a-z**

12) 'a.[bc]+'                      *afb or abc* pattern: a, followed by any character , then followed by either b or c

13) 'a.[0-9]'                      *ab1 or ah7* pattern: a, followed by any character, then followed by any digit 0-9.

14) '[a-z]+[\.\?!]'                      *a.?! Or b.?! Pattern: any letter from a-z followed by '?!'*

15) '[a-z]+[\.\?!]\s\*[A-Z]'                      *a.?! A or b.?! Z* pattern: any letter from a-z followed by '?!' followed by a space, and then 0 or more Uppercase Letters A-Z

16) '(very )+(cool )?(good|bad) weather'                      *very bad weather or very cool good weather* pattern: captured group ver,

*then weather.*

17) '-?[0-9]+' -8 or 7 *pattern: one or none '-', followed by any digit 0-9.*

18) `'-[0-9]*\.[0-9]*'` -2.6 or 4.8 *Pattern: one or none '-', followed by any digit 0-9. Followed by a period, followed by any digit 0-9.*

## Part II-b

## Regular Expression

**Write down the extended regular expression for following questions.**

**E.g. Social security number in the format of 999-99-9999. Answer:**

**[0-9]{3}-[0-9]{2}-[0-9]{4}**

**Points per question: 5**

19) Valid URL beginning with "http://" and ending with ".edu" (e.g. <http://cs.gsu.edu>, <http://gsu.edu>)

```
^(https?|ftp)://[^\s/$.?#].[^\s]*$@iS
```

20) Non-negative integers. (e.g. 0, +1, 3320)

\documentclass{article}

21) A valid absolute pathname in Unix (e.g. /home/ylong4, /test/try.c)

`\[a-zA-Z0-9_\-/]*^\[/]`

22) Identifiers which can be between 1 and 10 characters long, must start with a letter or an underscore. The following characters can be

letters or underscores or digits. (e.g. number, \_name1, isOK).

[a-z]{1,10}

23) Phone number in any of the following format: 9999999999,999-999-9999, (999)-999-9999. (Note: all of these formats should be matched by a single regular expression) homework

`\w9{3,}1s`

### Part III

#### Programming

#### Points per question: 15

24. Create a file named `homework_instructions.txt` using VI editor and type in it all the submission instructions from page1 of this document. Save the file in a directory named *homeworks* that you would have created. Set the permissions for this file such that only you can edit the file while anybody can only read. Find and list (on the command prompt) all the statements that contain the word POINTS. Submit your answer as a description of what you did in a sequential manner (e.g. Step1 ... Step 2... and so on..). Add a screenshot to your answer as a proof of evidence.

Step one: I used the command `vi` in order to create a text file named `homework_instructions.txt`.

Step two: After doing so, I entered in the submission instructions from page one of the homework.

Step three: I then exited `vi` editor and then I created a directory named `homeworks` (`mkdir homeworks`)

Step four: I set the permissions as I was asked (`chmod 644 homework_instructions.txt`) to owner read/write and all others read

Step five: I used grep to find the word points in the text file. (grep -i "points" homework\_instructions.txt)

Step six: That was successful so then I exited snowball.

Proof:

```
Hawa -- hsylla2@gsuad.gsu.edu@snowball:~/homeworks -- ssh hsylla2@snowball.cs.gsu.edu -- 165x65
Last login: Thu Jan 28 08:59:34 on console
Hawa@Hawas-MacBook-Pro ~ % ssh hsylla2@snowball.cs.gsu.edu
[hsylla2@snowball.cs.gsu.edu's password:
Last login: Tue Jan 26 09:10:39 2021 from 45-30-42-232.lightspeed.tukrga.sbcglobal.net

+
|   GSU Computer Science
|   | Instructional Server
|   | SNOWBALL.cs.gsu.edu
+

[hsylla2@gsuad.gsu.edu@snowball ~]$ vi <homework_instructions.txt>
-bash: syntax error near unexpected token 'newline'
[hsylla2@gsuad.gsu.edu@snowball ~]$ vi<homework_instructions.txt>
-bash: syntax error near unexpected token 'newline'
[hsylla2@gsuad.gsu.edu@snowball ~]$ vi homework_instructions.txt
[hsylla2@gsuad.gsu.edu@snowball ~]$ ls
csc3320 homework_instructions.txt lab2 public RealEstate.csv
[hsylla2@gsuad.gsu.edu@snowball ~]$ chmod 644 homework_instructions.txt
[hsylla2@gsuad.gsu.edu@snowball ~]$ ls-lah
-bash: ls-lah: command not found
[hsylla2@gsuad.gsu.edu@snowball ~]$ ls -la
total 136
drwx-----. 7 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 4096 Jan 29 19:35 .
drwxr-xr-x. 259 root root 12288 Jan 26 14:22 ..
-rw-----. 1 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 1314 Jan 26 09:18 .bash_history
-rw-----. 1 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 18 Jan 14 18:11 .bash_logout
-rw-----. 1 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 193 Jan 14 18:11 .bash_profile
-rw-----. 1 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 231 Jan 14 18:11 .bashrc
drwxrwxr-x. 3 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 4096 Jan 14 18:11 .cache
drwxrwxr-x. 3 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 4096 Jan 14 18:11 .config
drwxrwxr-x. 3 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 4096 Jan 21 18:20 csc3320
-rw-r--r--. 1 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 968 Jan 29 19:35 homework_instructions.txt
drwxrwxr-x. 2 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 4096 Jan 21 18:19 lab2
drwxrwxr-x. 4 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 4096 Jan 25 12:55 public
-rw-r--r--. 1 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 76133 Jan 25 12:03 RealEstate.csv
-rw-----. 1 hsylla2@gsuad.gsu.edu hsylla2@gsuad.gsu.edu 657 Jan 29 19:35 .viminfo
[hsylla2@gsuad.gsu.edu@snowball ~]$ ls
csc3320 homework_instructions.txt lab2 public RealEstate.csv
[hsylla2@gsuad.gsu.edu@snowball ~]$ mkdir
mkdir: missing operand
Try 'mkdir --help' for more information.
[hsylla2@gsuad.gsu.edu@snowball ~]$ mkdir homeworks
[hsylla2@gsuad.gsu.edu@snowball ~]$ ls
csc3320 homework_instructions.txt homeworks lab2 public RealEstate.csv
[hsylla2@gsuad.gsu.edu@snowball ~]$ mv homework_instructions.txt /homeworks
mv: cannot create regular file '/homeworks': Permission denied
[hsylla2@gsuad.gsu.edu@snowball ~]$ chmod 766 homework_instructions.txt
[hsylla2@gsuad.gsu.edu@snowball ~]$ mv homework_instructions.txt /homeworks
mv: cannot create regular file '/homeworks': Permission denied
[hsylla2@gsuad.gsu.edu@snowball ~]$ chmod 644 homework_instructions.txt
[hsylla2@gsuad.gsu.edu@snowball ~]$ mv homework_instructions.txt homeworks
[hsylla2@gsuad.gsu.edu@snowball ~]$ ls
csc3320 homeworks lab2 public RealEstate.csv
[hsylla2@gsuad.gsu.edu@snowball ~]$ cd homeworks
[hsylla2@gsuad.gsu.edu@snowball homeworks]$ ls
homework_instructions.txt
[hsylla2@gsuad.gsu.edu@snowball homeworks]$ grep homework_instructions.txt
[hsylla2@gsuad.gsu.edu@snowball homeworks]$ ls
homework_instructions.txt
[hsylla2@gsuad.gsu.edu@snowball homeworks]$ grep -i "points" homework_instructions.txt
Fill in your name, campus ID and panther # in the fields provided. If this information is missing in your document TWO POINTS WILL BE DEDUCTED per submission.
Keep this page 1 intact on all your submissions. If this submissions instructions page is missing in your submission TWO POINTS WILL BE DEDUCTED per submission.
[hsylla2@gsuad.gsu.edu@snowball homeworks]$
```