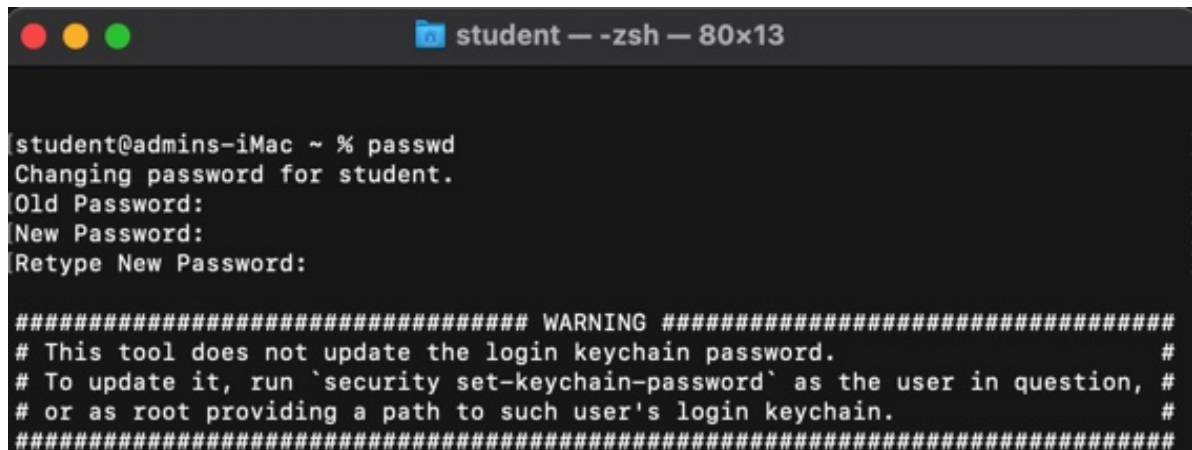


Problems to be solved in the lab:

Part A

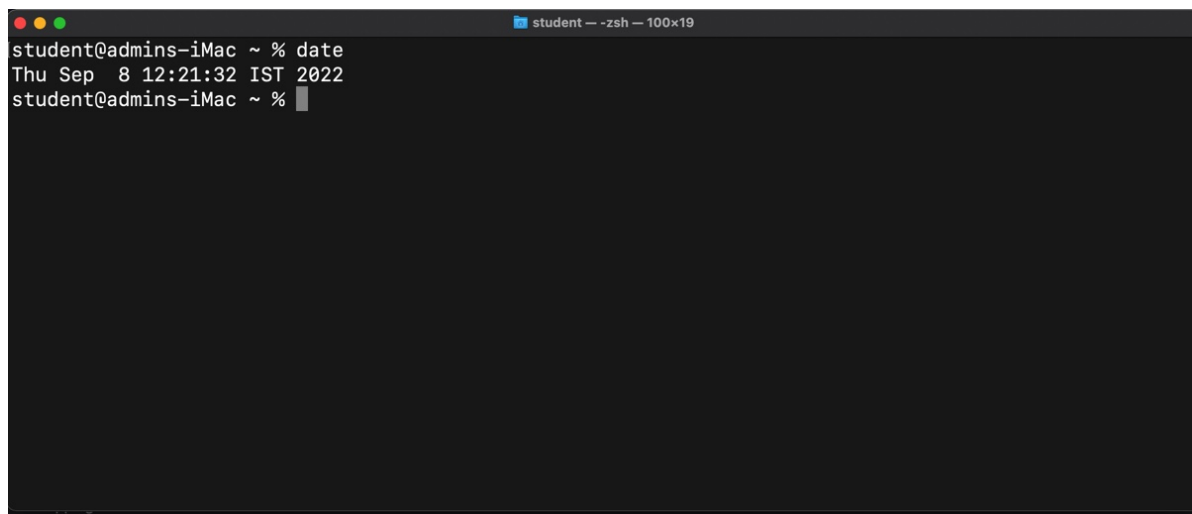
1. Change your password to a password you would like to use for the remainder of the semester.

A terminal window titled 'student -- -zsh -- 80x13' on a dark background. The prompt is 'student@admins-iMac ~ %'. The user enters 'passwd', and the system responds with 'Changing password for student.' followed by prompts for 'Old Password:', 'New Password:', and 'Retype New Password:'. Below these prompts, a warning message is displayed in all caps, enclosed in a block of hash symbols. The warning states that the tool does not update the login keychain password and provides instructions on how to update it using the 'security' command.

```
student@admins-iMac ~ % passwd
Changing password for student.
Old Password:
New Password:
Retype New Password:

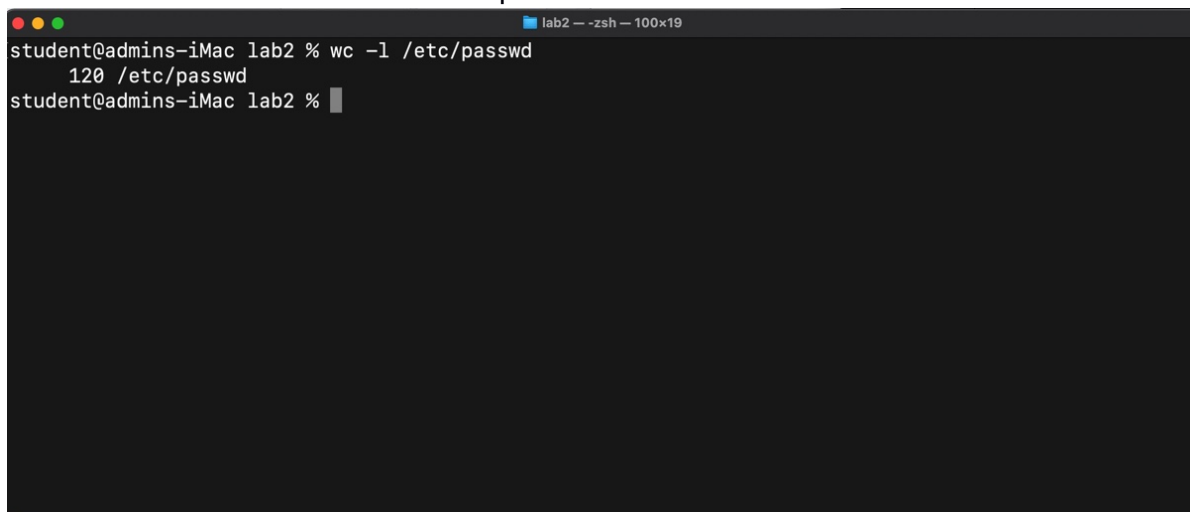
##### WARNING #####
# This tool does not update the login keychain password.                #
# To update it, run `security set-keychain-password` as the user in question, #
# or as root providing a path to such user's login keychain.            #
#####
```

2. Display the system's date.

A terminal window titled 'student -- -zsh -- 100x19' on a dark background. The prompt is 'student@admins-iMac ~ %'. The user enters 'date', and the system displays the current date and time: 'Thu Sep 8 12:21:32 IST 2022'.

```
student@admins-iMac ~ % date
Thu Sep 8 12:21:32 IST 2022
student@admins-iMac ~ %
```

3. Count the number of lines in the /etc/passwd file.

A terminal window titled 'lab2 -- -zsh -- 100x19' on a dark background. The prompt is 'student@admins-iMac lab2 %'. The user enters 'wc -l /etc/passwd', and the system outputs '120 /etc/passwd'.

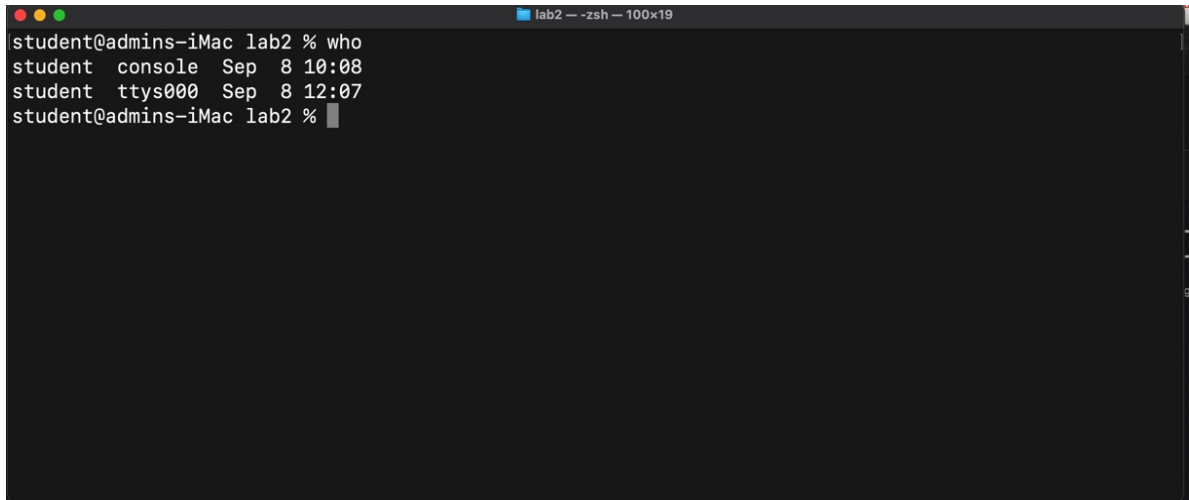
```
student@admins-iMac lab2 % wc -l /etc/passwd
120 /etc/passwd
student@admins-iMac lab2 %
```

Mihir Bhundia

12111126

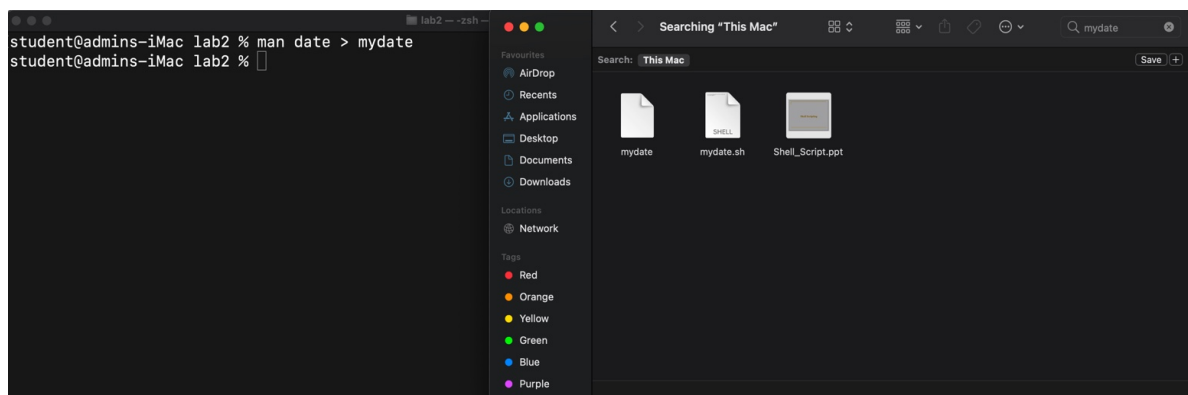
24

4. Find out who else is on the system.

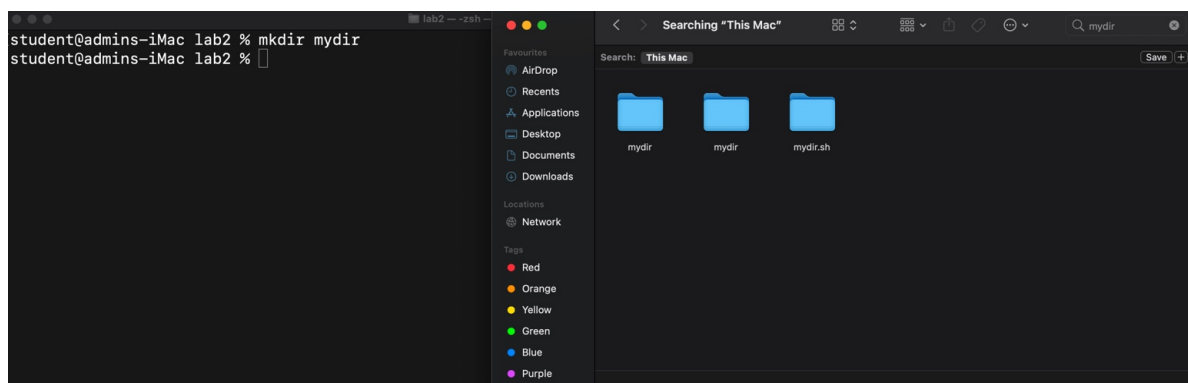


```
student@admins-iMac lab2 % who
student console Sep  8 10:08
student ttys000 Sep  8 12:07
student@admins-iMac lab2 %
```

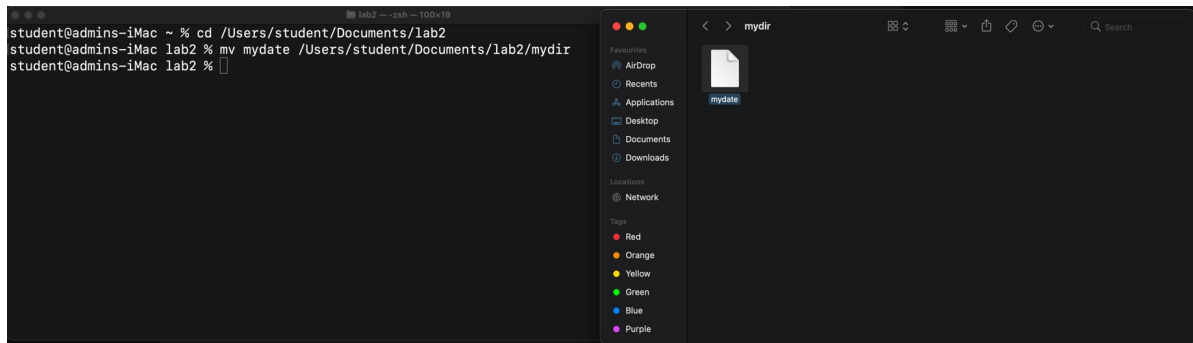
5. Direct the output of the man pages for the date command to a file named mydate.



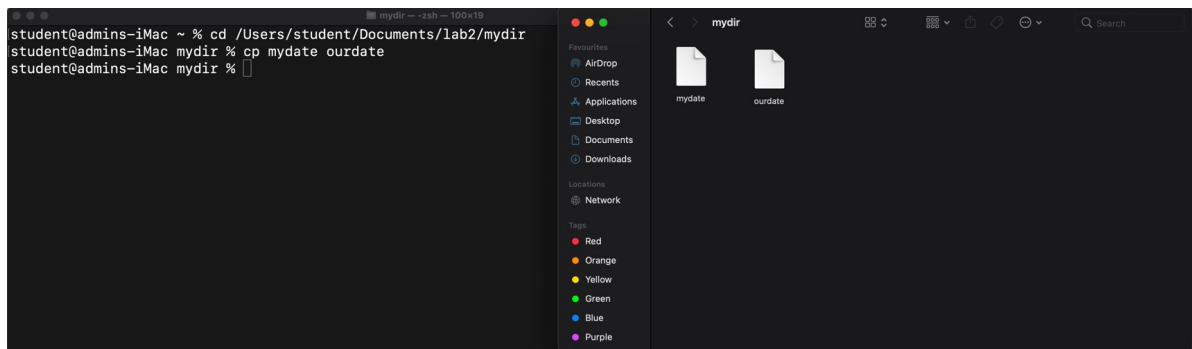
6. Create a subdirectory called mydir.



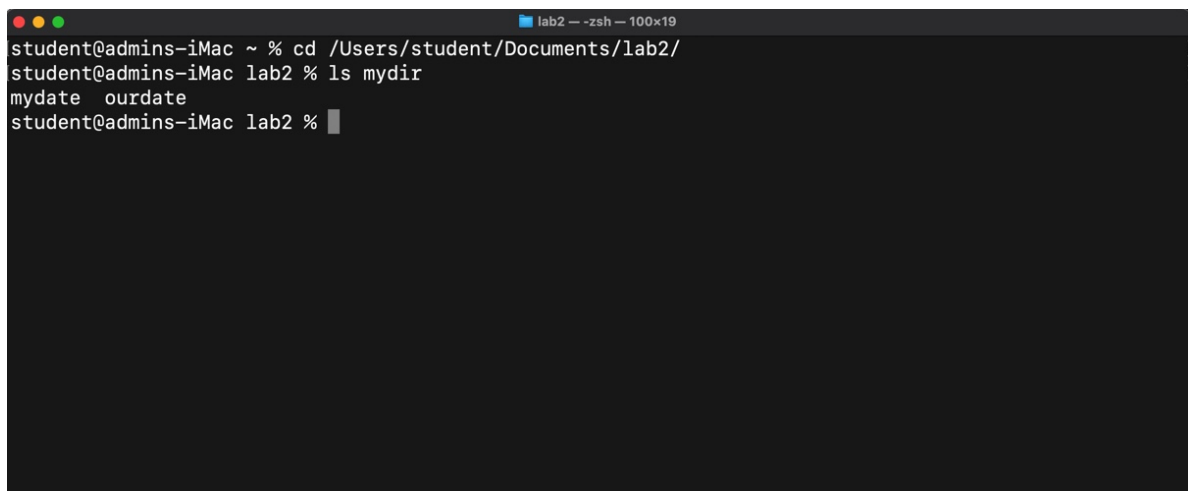
7. Move the file mydate into the new subdirectory.



8. Go to the subdirectory mydir and copy the file mydate to a new file called ourdate



9. List the contents of mydir.



10. Do a long listing on the file ourdate and note the permissions.

```
student@admins-iMac lab2 % ls -l ourdate
ls: ourdate: No such file or directory
student@admins-iMac lab2 % cd /Users/student/Documents/lab2/mydir
student@admins-iMac mydir % ls -l ourdate
-rw-r--r--@ 1 student  staff  12418 Sep  8 12:58 ourdate
student@admins-iMac mydir %
```

11. Display the name of the current directory starting from the root.

```
student@admins-iMac lab2 % ls -l ourdate
ls: ourdate: No such file or directory
student@admins-iMac lab2 % cd /Users/student/Documents/lab2/mydir
student@admins-iMac mydir % ls -l ourdate
-rw-r--r--@ 1 student  staff  12418 Sep  8 12:58 ourdate
student@admins-iMac mydir %
```

12. Move the files in the directory mydir back to your home directory.

```
student@admins-iMac ~ % cd /Users/student/Documents/lab2
student@admins-iMac lab2 % mv mydir Users/student
mv: rename mydir to Users/student: No such file or directory
student@admins-iMac lab2 % mv mydir /Users/student
student@admins-iMac lab2 %
```

13. Display the first 5 lines of mydate.

```
mydir -- -zsh -- 80x24
student@admins-iMac ~ % cd mydir
student@admins-iMac mydir % head -5 mydate

DATE(1)                                BSD General Commands Manual                                DATE(1)

NAME
  date -- display or set date and time
student@admins-iMac mydir %
```

14. Display the last 8 lines of mydate.

```
mydir -- -zsh -- 80x24
student@admins-iMac mydir % tail -8 mydate
  The date utility is expected to be compatible with IEEE Std 1003.2
  (``POSIX.2'').  The -d, -f, -j, -n, -r, -t, and -v options are all exten-
  sions to the standard.

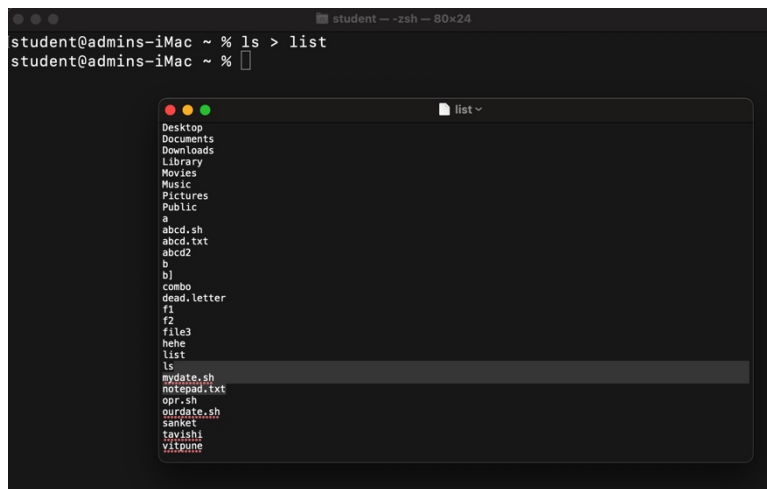
HISTORY
  A date command appeared in Version 1 AT&T UNIX.

BSD                                     May 7, 2015                                     BSD
student@admins-iMac mydir %
```

15. Remove the directory mydir.

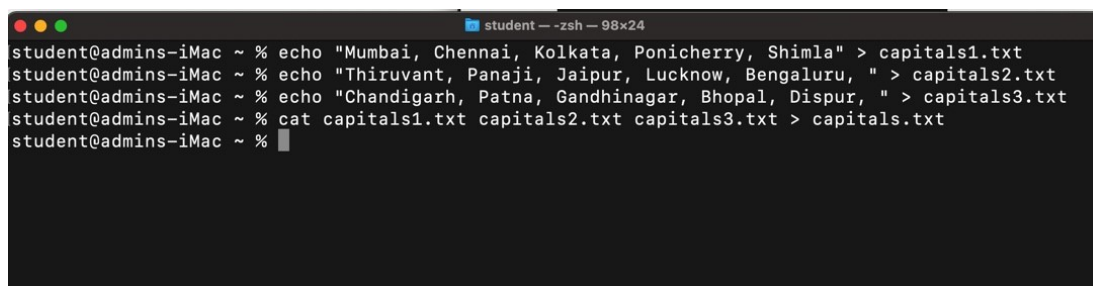
```
student -- -zsh -- 80x24
student@admins-iMac mydir % cd
student@admins-iMac ~ % rmdir mydir
rmdir: mydir: Directory not empty
student@admins-iMac ~ % rm mydir/* mydir/.
zsh: sure you want to delete all 2 files in /Users/student/mydir [yn]? y
student@admins-iMac ~ % rmdir mydir
student@admins-iMac ~ %
```

16. Redirect the output of the long listing of files to a file named list.



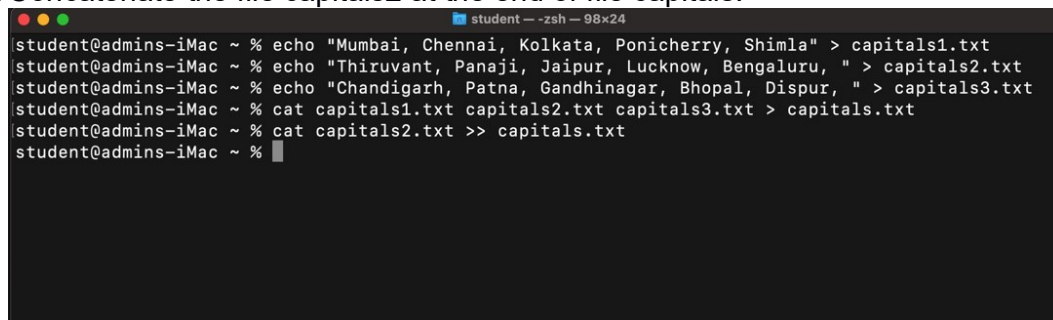
```
student@admins-iMac ~ % ls > list
student@admins-iMac ~ %
```

17. Select any 5 capitals of states in India and enter them in a file named capitals1. Choose 5 more capitals and enter them in a file named capitals2. Choose 5 more capitals and enter them in a file named capitals3. Concatenate all 3 files and redirect the output to a file named capitals.



```
student@admins-iMac ~ % echo "Mumbai, Chennai, Kolkata, Ponicherry, Shimla" > capitals1.txt
student@admins-iMac ~ % echo "Thiruvant, Panaji, Jaipur, Lucknow, Bengaluru, " > capitals2.txt
student@admins-iMac ~ % echo "Chandigarh, Patna, Gandhinagar, Bhopal, Dispur, " > capitals3.txt
student@admins-iMac ~ % cat capitals1.txt capitals2.txt capitals3.txt > capitals.txt
student@admins-iMac ~ %
```

18. Concatenate the file capitals2 at the end of file capitals.



```
student@admins-iMac ~ % echo "Mumbai, Chennai, Kolkata, Ponicherry, Shimla" > capitals1.txt
student@admins-iMac ~ % echo "Thiruvant, Panaji, Jaipur, Lucknow, Bengaluru, " > capitals2.txt
student@admins-iMac ~ % echo "Chandigarh, Patna, Gandhinagar, Bhopal, Dispur, " > capitals3.txt
student@admins-iMac ~ % cat capitals1.txt capitals2.txt capitals3.txt > capitals.txt
student@admins-iMac ~ % cat capitals2.txt >> capitals.txt
student@admins-iMac ~ %
```

19. Give read and write permissions to all users for the file capitals.

```
student@admins-iMac ~ % chmod 755 capitals.txt
student@admins-iMac ~ %
```

20. Give read permissions only to the owner of the file capitals. Open the file, make some changes and try to save it. What happens ?

File can be edited

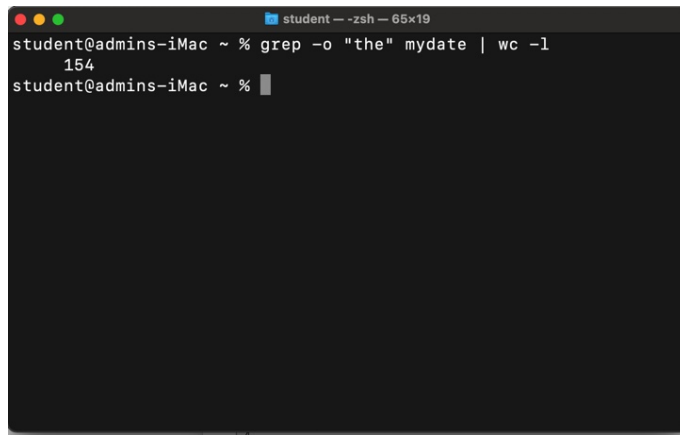
```
student@admins-iMac ~ % chmod 700 capitals.txt
student@admins-iMac ~ %
```

```
student@admins-iMac ~ % cat capitals.txt
Mumbai, Chennai, Kolkata, Ponicherry, Shimla
Thiruvant, Panaji, Jaipur, Lucknow, Bengaluru,
Chandigarh, Patna, Gandhinagar, Bhopal, Dispur,
Thiruvant, Panaji, Jaipur, Lucknow, Bengaluru,
student@admins-iMac ~ % echo "TEST" >> capitals.txt
student@admins-iMac ~ % cat capitals.txt
Mumbai, Chennai, Kolkata, Ponicherry, Shimla
Thiruvant, Panaji, Jaipur, Lucknow, Bengaluru,
Chandigarh, Patna, Gandhinagar, Bhopal, Dispur,
Thiruvant, Panaji, Jaipur, Lucknow, Bengaluru,
TEST
student@admins-iMac ~ %
```

21. Create an alias to concatenate the 3 files capitals1, capitals2, capitals3 and redirect the output to a file named capitals. Activate the alias and make it run.

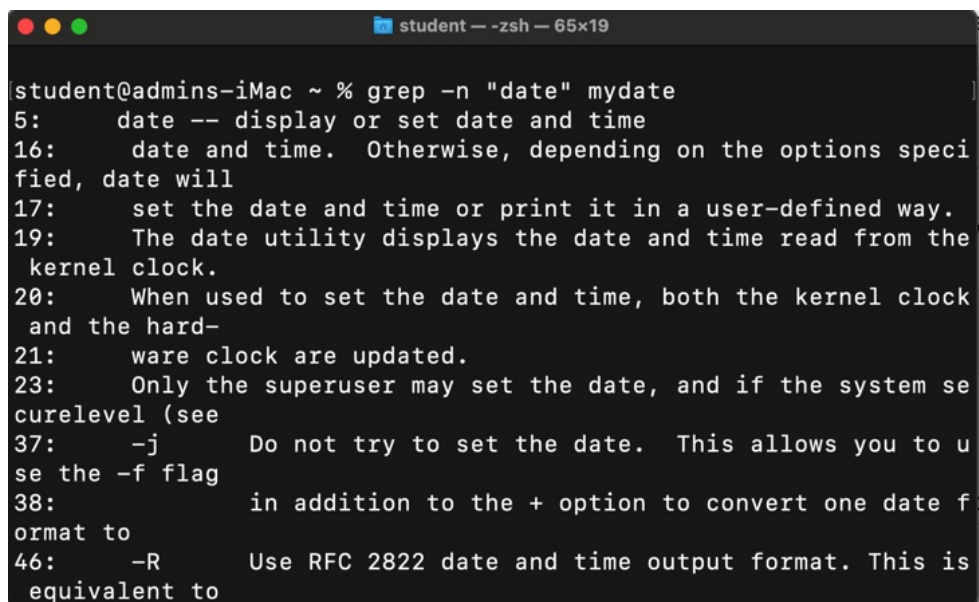
```
student@admins-iMac ~ % alias concat='cat capitals1.txt capitals2.txt capitals3.txt > capitals.txt'
student@admins-iMac ~ % concat
student@admins-iMac ~ % cat capitals.txt
Mumbai, Chennai, Kolkata, Ponicherry, Shimla
Thiruvant, Panaji, Jaipur, Lucknow, Bengaluru,
Chandigarh, Patna, Gandhinagar, Bhopal, Dispur,
student@admins-iMac ~ %
```

22. Find out the number of times the string “the” appears in the file mydate.



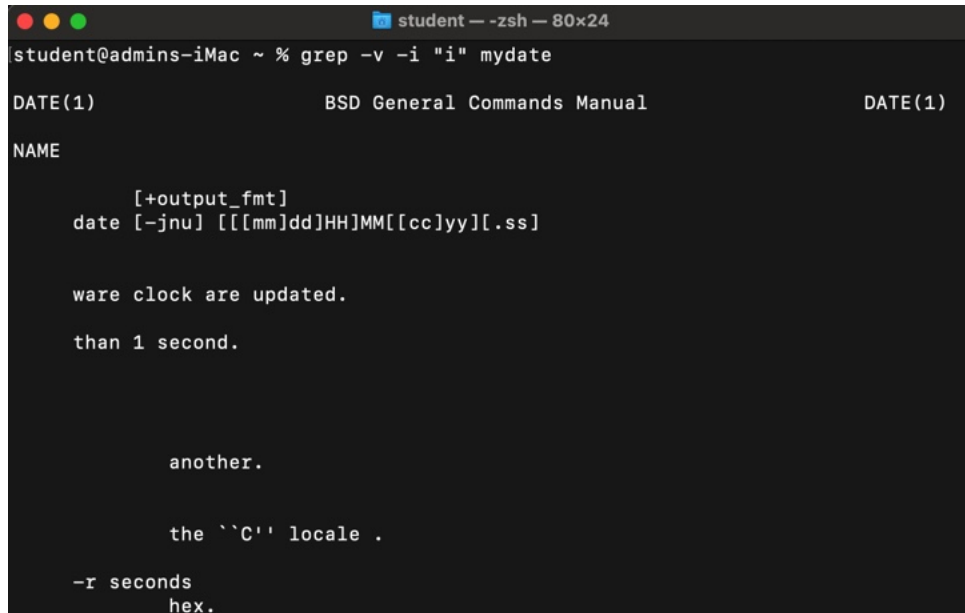
```
student@admins-iMac ~ % grep -o "the" mydate | wc -l
154
student@admins-iMac ~ %
```

23. Find out the line numbers on which the string “date” exists in mydate.



```
student@admins-iMac ~ % grep -n "date" mydate
5:      date -- display or set date and time
16:     date and time.  Otherwise, depending on the options speci
fied, date will
17:     set the date and time or print it in a user-defined way.
19:     The date utility displays the date and time read from the
kernel clock.
20:     When used to set the date and time, both the kernel clock
and the hard-
21:     ware clock are updated.
23:     Only the superuser may set the date, and if the system se
curelevel (see
37:     -j      Do not try to set the date.  This allows you to u
se the -f flag
38:           in addition to the + option to convert one date f
ormat to
46:     -R      Use RFC 2822 date and time output format. This is
equivalent to
```


24. Print all lines of mydate except those that have the letter "i" in them.



```
student — zsh — 80x24
student@admins-iMac ~ % grep -v -i "i" mydate
DATE(1)                                BSD General Commands Manual                                DATE(1)
NAME
    [+output_fmt]
    date [-jnu] [[mm]dd]HH]MM[[cc]yy][.ss]

    ware clock are updated.

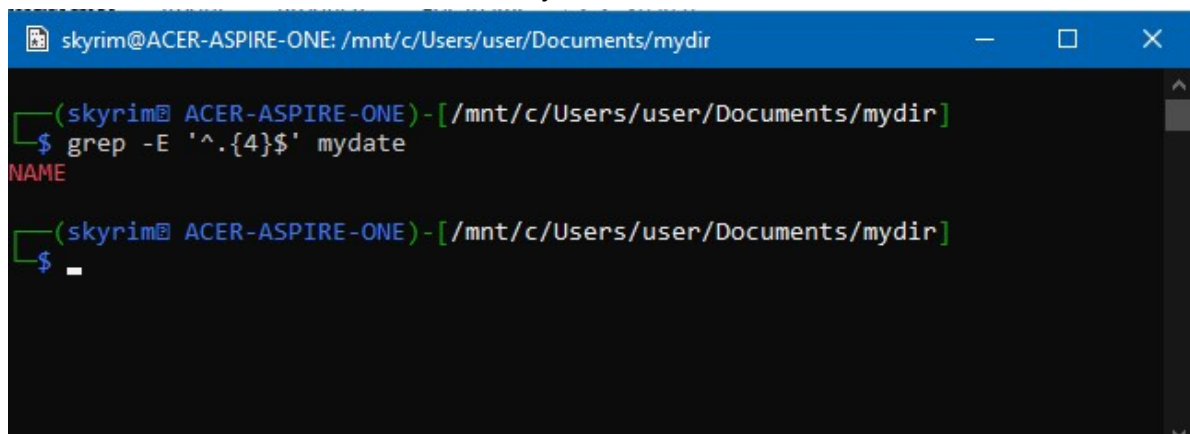
    than 1 second.

    another.

    the ``C'' locale .

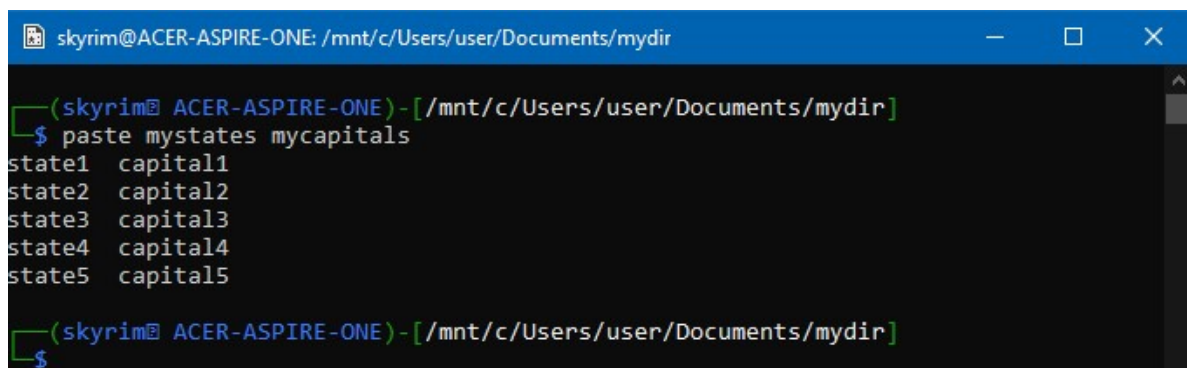
    -r seconds
    hex.
```

25. List the words of 4 letters from the file mydate.



```
skyrim@ACER-ASPIRE-ONE: /mnt/c/Users/user/Documents/mydir
(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/Users/user/Documents/mydir]
$ grep -E '^.{4}$' mydate
NAME
(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/Users/user/Documents/mydir]
$ _
```

26. List 5 states in north east India in a file mystates. List their corresponding capitals in a file mycapitals. Use the paste command to join the 2 files.



```
skyrim@ACER-ASPIRE-ONE: /mnt/c/Users/user/Documents/mydir
(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/Users/user/Documents/mydir]
$ paste mystates mycapitals
state1 capital1
state2 capital2
state3 capital3
state4 capital4
state5 capital5
(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/Users/user/Documents/mydir]
$
```

27. Use the cut command to print the 1 st and 3 rd columns of the /etc/passwd file for all students in this class.

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir

(skylim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ cut -f 1,3 /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
lapt:x:100:65534:/:nonexistent:/usr/sbin/nologin
systemd-network:x:101:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:102:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
skyrim:x:1000:1000:,,,:/home/skyrim:/bin/bash

(skylim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$
```

28. Count the number of people logged in and also trap the users in a file using the tee command.

```
root@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir

(root@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
# who | wc -l > count.txt;

(root@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
# cat count.txt
7

(root@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
#
```

29. Convert the contents of mystates into uppercase.

```
root@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir
(root@ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
# cat mystates | tr [:lower:] [:upper:]
STATE1
STATE2
STATE3
STATE4
STATE5

(root@ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
# _
```

30. Create any two files & display the common values between them.

```
root@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir
(root@ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
# cat 1; cat 2
1
2
3
4
5
6
7
8
9
0
23
67
988
3
4
7
9
988
23
1
45
55
66
77
98
(root@ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
# comm -12 <( sort 1 ) <( sort 2 )
1
23
3
4
7
9
988
```

Part B

1. Basic Arithmetic

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir

(skylim@ ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
$ cat b1.bash
#!/bin/bash
read -p "Enter first number: " num1
read -p "Enter second number: " num2
sum=$(( $num1 + $num2 ))
echo "Sum is: $sum"
diff=$(( $num1 - $num2 ))
echo "Difference is: $diff"
(skylim@ ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
$ bash b1.bash
Enter first number: 1
Enter second number: 2
Sum is: 3
Difference is: -1
```

2. Control Structure

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir

(skylim@ ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
$ cat b2.bash
#!/bin/bash
echo "Enter Two Numbers:"
read n1
read n2
if [ $n1 -gt $n2 ]
then
    echo "$n1 is greater than $n2"
else
    echo "$n2 is greater than $n1"
fi
(skylim@ ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
$ bash b2.bash
Enter Two Numbers:
99
100
100 is greater than 99
(skylim@ ACER-ASPIRE-ONE)-[/mnt/c/users/user/documents/mydir]
$ _
```

3. Loop

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir

(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ cat b3.bash
#!/bin/bash
echo "Enter a Number"
read n
i=1
while [ $i -le 10 ]
do
    echo " $n x $i = $(( n * i ))"
    i=$(( i + 1 ))
done
(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ bash b3.bash
Enter a Number
5
5 x 1 = 5
5 x 2 = 10
5 x 3 = 15
5 x 4 = 20
5 x 5 = 25
5 x 6 = 30
5 x 7 = 35
5 x 8 = 40
5 x 9 = 45
5 x 10 = 50
```

4. Command line argument

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir

(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ cat b4.bash
#!/bin/bash
sum=$(( $1 + $2 ))
echo "Sum is: $sum"
(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ ./b4.bash 4 6
Sum is: 10
```

5. Functions

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir

(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ add() {
> sum=0
> i=1
> len=$#
> x=$((len+1))
> while [ $i -lt $x ]
> do
> arg=${!i}
> sum=$((sum + arg))
> i=$((i + 1))
> done
> echo $sum
> }

(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ add 1 2 3
6

(skyrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$
```


6. Arrays

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir
(skylrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ cat b6.bash
#!/bin/bash
array=(Alpha Beta Charlie Delta Echo Gamma)
echo ${array[*]}
(skylrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ bash b6.bash
Alpha Beta Charlie Delta Echo Gamma
```

7. String operation

```
skyrim@ACER-ASPIRE-ONE: /mnt/c/users/user/documents/mydir
(skylrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ cat b7.bash
#!/bin/bash
echo "Concatenate 3 Words"
echo "Enter Three Words:"
read w1
read w2
read w3
w=$w1$w2$w3
echo "$w"
(skylrim@ ACER-ASPIRE-ONE) - [/mnt/c/users/user/documents/mydir]
$ bash b7.bash
Concatenate 3 Words
Enter Three Words:
Word1
Word2
Word3
Word1Word2Word3
```