Part A

What will the following commands do?

- echo "Hello, World!"
  - ⇨ echo is use to send text, variables, and special characters to the standard output. print output "Hello World."

```
cdac@HP:~$ echo "Hello, World"
Hello, World
cdac@HP:~$
```

- name="Productive"
  - ⇨ name is a variable.
  - ⇨ "= " is a assignment operator.
  - ⇨ Productive is a string value.
  - ⇨

```
cdac@HP:~/information/assignment$ name=Productivity
cdac@HP:~/information/assignment$ echo $name
Productivity
```

- touch file.txt
  - ⇨ touch is used to create new file. like as "file.txt".

```
cdac@HP:~/information/assignment$ touch file.txt
cdac@HP:~/information/assignment$ ls
file.txt
cdac@HP:~/information/assignment$
```

- ls –a
  - ⇨ ls is used to list the contents of a directory.
  - ⇨ ls -a is also listing the hidden files.
  - ⇨

```
cdac@HP:~/information/assignment$ ls -a
.  ..  file.txt
```

- rm file.txt
  - ⇨ rm command remove the file.

```
cdac@HP:~/information/assignment$ rm file.txt
cdac@HP:~/information/assignment$ ls
file1.txt
```

- cp file1.txt file2.txt
  - ⇨ cp command copy file or directories to same or different location.

```
cdac@HP:~/information/assignment$ cp file.txt file1.txt
cdac@HP:~/information/assignment$ cat file1.txt
hi
hello
everyone
```

- mv file.txt /path/to/directory/
  - ⇨ mv is used to move files or directories from one location to another.
  - ⇨ /path/to/directory/ this is the destination directory where you want to move the file.

```
cdac@HP:~/information$ mv data.txt assignment
cdac@HP:~/information$ cd assignment
cdac@HP:~/information/assignment$ ls
data.txt  file.txt  file1.txt
```

- chmod 755 script.sh
  - ⇨ chmod command managing files and directory permissions.
  - ⇨ chmod 755 give the owner full permissions.
  - ⇨ script.sh is the name of file.

```
cdac@HP:~/information/assignment$ chmod 755 script.sh
cdac@HP:~/information/assignment$ ls -l
total 16
-rw-rwxrwx 1 cdac cdac 114 Aug 29 20:53 data.txt
-rw-r--r-- 1 cdac cdac  19 Aug 30 20:14 file.txt
-rw-r--r-- 1 cdac cdac  19 Aug 30 20:14 file1.txt
-rwxr-xr-x 1 cdac cdac  48 Aug 30 20:36 script.sh
```

- grep "pattern" file.txt
  - ⇨ grep -Searches for a pattern in a file.

```
cdac@HP:~/information$ cat file.txt
hi
pattern
hello
bye
cdac@HP:~/information$ grep "pattern" file.txt
pattern
```

- kill PID
  - ⇨ kill command Sends a signal to a process to terminate it.

- mkdir mydir && cd mydir && touch file.txt && echo "Hello, World!"> file.txt && cat file.txt
  - ⇨ mkdir create new directory
  - ⇨ && - It ensures that the next command only runs if the previous command was successful
  - ⇨ cd -to change directory
  - ⇨ touch create new file
  - ⇨ echo Prints a message to the terminal.
  - ⇨ > redirection symbol
  - ⇨ Cat command display content of the file on console.

```
cdac@HP:~/information$ mkdir mydir && cd mydir && touch file.txt && echo "Hello, World!" > file.txt && cat file.txt
Hello, World!
```

- ls -l | grep ".txt"
  - ⇨ ls -l lists files and directories in the current directory
  - ⇨ ' | ' (pipe) - to redirect the standard output of one command to the standard input of another command.
  - ⇨ grep searches for a patterns in a file.

```
cdac@HP:~/information$ ls -l | grep ".txt"
-rw-r--r-- 1 cdac cdac   28 Aug 29 21:43 duplicate.txt
-rw-r--r-- 1 cdac cdac   22 Aug 30 21:00 file.txt
-rw-r--r-- 1 cdac cdac   60 Aug 29 21:48 fruit.txt
-rw-r--r-- 1 cdac cdac   41 Aug 29 21:24 input.txt
-rw-r--r-- 1 cdac cdac   42 Aug 29 21:04 number.txt
-rw-r--r-- 1 cdac cdac   41 Aug 29 21:30 output.txt
cdac@HP:~/information$
```

- cat file1.txt file2.txt | sort | uniq
  - ⇨ cat file1.txt file2.txt concatenate the contents of two files,
  - ⇨ sort the combined contents
  - ⇨ Using uniq to remove duplicate lines.

```
cdac@HP:~/information/mydir$ nano file.txt
cdac@HP:~/information/mydir$ cat file.txt
Hello, World!
hii
good
bye
cdac@HP:~/information/mydir$ nano file1.txt
cdac@HP:~/information/mydir$ cat file1.txt
hi
bye
good
cdac@HP:~/information/mydir$ cat file.txt file1.txt|sort|uniq
Hello, World!
bye
good
hi
hii
```

- ls -l | grep "^d"
  - ⇨ ls -l list all files and directories
  - ⇨ grep “^d” it means matching only lines that start with "d".

```
cdac@HP:~/information/assignment$ ls
dac  data.txt  day.txt  def.txt  file.txt  file1.txt  script.sh
cdac@HP:~/information/assignment$ ls -l | grep "^d"
drwxr-xr-x 2 cdac cdac 4096 Aug 30 21:33 dac
```

- grep -r "pattern" /path/to/directory/
  - ⇨ grep –r “pattern” it search all files within this directory and its subdirectories for the specified pattern, recursively

```
cdac@HP:~/information/assignment/dac$ grep -r "hi" ~/information/assignment/dac/
/home/cdac/information/assignment/dac/abc.txt:hi
cdac@HP:~/information/assignment/dac$
```

- cat file1.txt file2.txt | sort | uniq –d
  - ⇨ concatenate both files and display duplicate words only using this command

```
apple
banana
mango
cherry
cdac@HP:~/information/assignment$ cat file.txt
Apple
mango
pinapple
chikku
cdac@HP:~/information/assignment$ cat file.txt file1.txt | sort | uniq -d
mango
```

- chmod 644 file.txt
  - ⇨ owner can read and write the file or directory and other users can only read it.

```
cdac@HP:~/information/assignment/dac$ chmod 644 file.txt
cdac@HP:~/information/assignment/dac$ ls -l
total 4
-rw-r--r-- 1 cdac cdac 7 Aug 30 21:47 abc.txt
-rw-r--r-- 1 cdac cdac 0 Aug 30 21:54 file.txt
```

- cp -r source_directory destination_directory
  ⇨ copy content of source directory to destination directory.

```
cdac@HP:~/information/assignment$ cp -r dac dacs
cdac@HP:~/information/assignment$ ls -r dacs
dac
```

- find /path/to/search -name "*.txt"
  ⇨ find is used to search for files and directories in directory hierarchy
  ⇨ /path/to/search - search actual path to the directory.
  ⇨ "*.txt" matches sequence of characters

- chmod u+x file.txt
  ⇨ To give permission to owner to execute a file

```
cdac@HP:~/information/assignment/dac$ chmod u+x file.txt
cdac@HP:~/information/assignment/dac$ ls -l
total 4
-rw-r--r-- 1 cdac cdac 7 Aug 30 21:47 abc.txt
-rwxr--r-- 1 cdac cdac 0 Aug 30 21:54 file.txt
cdac@HP:~/information/assignment/dac$
```

- $PATH
  ⇨ to find the executable file corresponding to that command.

Part B

Identify True or False:

1. ls is used to list files and directories in a directory.
Ans: **True.** ls command is used list files and diretories in diretory

2. mv is used to move files and directories.
Ans: **True** mv command used to move files

3. cd is used to copy files and directories.
Ans: **False.** cd command used to change directory. Move present directory to another directory.

4. pwd stands for "print working directory" and displays the current directory.
Ans: **True**

5. grep is used to search for patterns in files.
Ans: **True**

6. chmod 755 file.txt gives read, write, and execute permissions to the owner, and read and execute permissions to group and others.
   Ans: **True**

7. mkdir -p directory1/directory2 creates nested directories, creating directory2 inside directory1 if directory1 does not exist.
   Ans: **True**

8. rm -rf file.txt deletes a file forcefully without confirmation.
   Ans: **True**

Identify the Incorrect Commands:

1. chmodx is used to change file permissions.

Ans: **chmod** command is used to change file permissions **chmod +x** is for add executable permission

2. cpy is used to copy files and directories.

Ans. Incorrect **cpy** command not used to copy files.

- ⇨ **cp** command used to copy files

3. mkfile is used to create a new file.

Ans: **mkfile** is used to create new file but it not support for all operating system

4. catx is used to concatenate files.

Ans: **cat** command used to concatenate files and also diplay file contents.

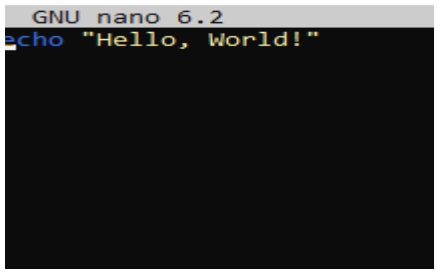
5. rn is used to rename files.

Ans Incorrect

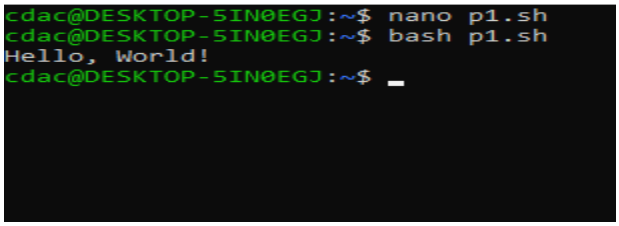
mv command used to rename files.

Part C

Question 1: Write a shell script that prints "Hello, World!" to the terminal.



Output:



Question 2: Declare a variable named "name" and assign the value "CDAC Mumbai" to it. Print the value of the variable.

```
cdac@DESKTOP-5IN0EGJ: ~
  GNU nano 6.2
Name="CDAC Mumbai"
echo $Name
```

Output:

```
cdac@DESKTOP-5IN0EGJ:~$ nano p2.sh
cdac@DESKTOP-5IN0EGJ:~$ bash p2.sh
CDAC Mumbai
cdac@DESKTOP-5IN0EGJ:~$
```

Question 3: Write a shell script that takes a number as input from the user and prints it.

```
cdac@DESKTOP-5IN0EGJ: ~
  GNU nano 6.2
echo "Enter Number:"
read Num1
echo Number is: $Num1
```

Output:

```
cdac@DESKTOP-5IN0EGJ:~$ nano p3
cdac@DESKTOP-5IN0EGJ:~$ bash p3
Enter Number:
23
Number is: 23
cdac@DESKTOP-5IN0EGJ:~$
```

Question 4: Write a shell script that performs addition of two numbers (e.g., 5 and 3) and prints the result.

```
cdac@DESKTOP-5IN0EGJ: ~
  GNU nano 6.2
#!/bin/bash
echo Enter 1st Number:
read num1
echo Enter 2nd Number:
read num2
sum=$(($num1 + $num2))
echo Addition of Two Number is: $sum
```

Output

```
cdac@DESKTOP-5IN0EGJ:~$ nano p4
cdac@DESKTOP-5IN0EGJ:~$ bash p4
Enter 1st Number:
23
Enter 2nd Number:
25
Addition of Two Number is: 48
cdac@DESKTOP-5IN0EGJ:~$
```

Question 5: Write a shell script that takes a number as input and prints "Even" if it is even, otherwise prints "Odd".

```
  GNU nano 6.2
#!/bin/bash

echo Enter a number:
read num1
if [ $(($num1 % 2)) -eq 0 ]
then
echo $num1 is Even Number
else
echo $num1 is odd Number
fi
```

Output

```
cdac@DESKTOP-5IN0EGJ:~$ nano p5
cdac@DESKTOP-5IN0EGJ:~$ bash p5
Enter a number:
23
23 is odd Number
cdac@DESKTOP-5IN0EGJ:~$ bash p5
Enter a number:
44
44 is Even Number
cdac@DESKTOP-5IN0EGJ:~$
```

Question 6: Write a shell script that uses a for loop to print numbers from 1 to 5.

```
  GNU nano 6.2
#!/bin/bash

echo Number from 1 to 5
for (( i=1; i<=5 ; i++))
do
echo $i
done
```

Output:

```
cdac@DESKTOP-5IN0EGJ:~$ nano p6
cdac@DESKTOP-5IN0EGJ:~$ bash p6
Number from 1 to 5
1
2
3
4
5
cdac@DESKTOP-5IN0EGJ:~$
```

Question 7: Write a shell script that uses a while loop to print numbers from 1 to 5.

cdac@DESKTOP-5IN0EGJ: ~

```
  GNU nano 6.2
#!/bin/bash

echo Numbers from 1 to 5
i=1

while (( i<=5 ))
do
  echo $i
i=$(($i+1))
done
```

Output:

cdac@DESKTOP-5IN0EGJ: ~

```
cdac@DESKTOP-5IN0EGJ:~$ nano p7
cdac@DESKTOP-5IN0EGJ:~$ bash p7
Numbers from 1 to 5
1
2
3
4
5
cdac@DESKTOP-5IN0EGJ:~$
```

Question 8: Write a shell script that checks if a file named "file.txt" exists in the current directory. If it does, print "File exists", otherwise, print "File does not exist".

```
  GNU nano 6.2
#!/bin/bash

filename="/home/cdac/abc.txt"
if [ -f $filename ]
then
echo "File exits"
else
echo "File does not exits"
fi
```

Output:

```
cdac@DESKTOP-5IN0EGJ:~$ nano p8
cdac@DESKTOP-5IN0EGJ:~$ bash p8
File exits
cdac@DESKTOP-5IN0EGJ:~$ nano p8
cdac@DESKTOP-5IN0EGJ:~$ bash p8
File does not exits
cdac@DESKTOP-5IN0EGJ:~$
```

Question 9: Write a shell script that uses the if statement to check if a number is greater than 10 and prints a message accordingly.

```
  GNU nano 6.2
#!/bin/bash
echo Enter a Number:
read num1
if [ $num1 -gt 10 ]
then
echo Number is greater than 10
else
echo Number not grater than 10
fi
```

Output:

```
cdac@DESKTOP-5IN0EGJ:~$ nano p9
cdac@DESKTOP-5IN0EGJ:~$ bash p9
Enter a Number:
5
Number not grater than 10
cdac@DESKTOP-5IN0EGJ:~$ bash p9
Enter a Number:
23
Number is greater than 10
cdac@DESKTOP-5IN0EGJ:~$
```

Question 10: Write a shell script that uses nested for loops to print a multiplication table for numbers from 1 to 5. The output should be formatted nicely, with each row representing a number and each column representing the multiplication result for that number.

```
  GNU nano 6.2
#!/bin/bash
echo Multiplition Table for Numbers from 1 to 5:
for (( i=1;i<=10;i++ ))
do
for (( j=1;j<=10;j++ ))
do
result=$((i*j))
printf "%4d" $result
done
echo
done
```

Output:

```
dac@DESKTOP-5IN0EGJ:~$ nano p10
dac@DESKTOP-5IN0EGJ:~$ bash p10
ultiplition Table for Numbers from 1 to 10:
   1   2   3   4   5   6   7   8   9  10
   2   4   6   8  10  12  14  16  18  20
   3   6   9  12  15  18  21  24  27  30
   4   8  12  16  20  24  28  32  36  40
   5  10  15  20  25  30  35  40  45  50
   6  12  18  24  30  36  42  48  54  60
   7  14  21  28  35  42  49  56  63  70
   8  16  24  32  40  48  56  64  72  80
   9  18  27  36  45  54  63  72  81  90
  10  20  30  40  50  60  70  80  90 100
dac@DESKTOP-5IN0EGJ:~$
```

Question 11: Write a shell script that uses a while loop to read numbers from the user until the user enters a negative number. For each positive number entered, print its square. Use the break statement to exit the loop when a negative number is entered.

```
  GNU nano 6.2
#!/bin/bash
while true
do
echo Enter a Number
read num1
if [ $num1 -lt 0 ]
then
  echo Negative Number Entered. Exiting.
  break
fi
square=$((num1*num1))
echo The Squareof $num1 is $square
done
```

Output

```
cdac@DESKTOP-5IN0EGJ:~$ nano p11
cdac@DESKTOP-5IN0EGJ:~$ bash p11
Enter a Number
4
The Squareof 4 is 16
Enter a Number
3
The Squareof 3 is 9
Enter a Number
11
The Squareof 11 is 121
Enter a Number
-44
Negative Number Entered. Exiting.
cdac@DESKTOP-5IN0EGJ:~$
```

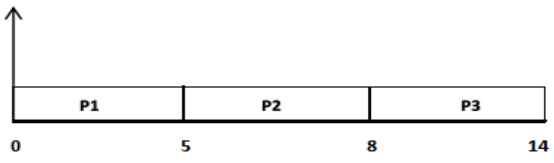
Part E

1. Consider the following processes with arrival times and burst times:

Process	Arrival Time	Burst Time
P1	0	5
P2	1	3
P3	2	6

Calculate the average waiting time using First-Come, First-Served (FCFS) scheduling.

	Arrival Time	Burst Time	Waiting Time	Turn Around Time
P1	0	5	0	5
P2	1	3	4	7
P3	2	6	6	12



Avg Waiting Time-10/3=3.3

TAT=5+7+12=24/3=8

2. Consider the following processes with arrival times and burst times:

Process	Arrival Time	Burst Time
P1	0	3
P2	1	5
P3	2	1
P4	3	4

Calculate the average turnaround time using Shortest Job First (SJF) scheduling.

Shortest Job First

	AT	BT	W	TAT
P1	0	3	0	3
P2	1	5	7	12
P3	2	1	1	2
P4	3	4	1	5

Gant Chart		P1	P3	P4	P2
	0	3	4	8	13
TAT	3+12+2+5	22	/4	5.5	

3. Consider the following processes with arrival times, burst times, and priorities (lower number indicates higher priority):

Process	Arrival Time	Burst Time	Priority
P1	0	6	3
P2	1	4	1
P3	2	7	4
P4	3	2	2

Calculate the average waiting time using Priority Scheduling.

Priority Scheduling Algorithm

	AT	BT	PRIORITY	WAT	TAT
P1	0	6	3	3	12
P2	1	4	1	12	4
P3	2	7	4	2	17
P4	3	2	2	5	4

Gant Chart		P1	P2	P4	P1	P3
	0	1	5	7	12	19
TAT	12+4+17+4	37	/4	9.2		

4. Consider the following processes with arrival times and burst times, and the time quantum for Round Robin scheduling is 2 units:

Process	Arrival Time	Burst Time
P1	0	4
P2	1	5
P3	2	2
P4	3	3

Calculate the average turnaround time using Round Robin scheduling.

Round Robin Algorithm

	AT	BT	WAT	TAT
P1	0	4	3	10
P2	1	5	12	13
P3	2	2	2	4
P4	3	3	5	10

Gant Chart		P1	P2	P3	P4	P1	P2	P4	P2
	0	2	4	6	8	10	12	13	14
TAT	12+4+17+4	37	/4	9.2					

5. Consider a program that uses the fork() system call to create a child process. Initially, the parent process has a variable x with a value of 5. After forking, both the parent and child processes increment the value of x by 1. What will be the final values of x in the parent and child processes after the fork() call?

```c
#include<stdio.h>
#include<unistd.h>
int main(void)
{
    int x = 5;
    fork();
    x = x + 1;
    printf("%d\n", x);
    return 0;
}
```

Output

```
cdac@HP:~/ShellProgram$ nano Fork.c
cdac@HP:~/ShellProgram$ gcc Fork.c
cdac@HP:~/ShellProgram$ ./a.out
6
6
cdac@HP:~/ShellProgram$
```