Concepts of Operating System Assignment 2

Name: Shantanu Laxman Chaudhari
Course: PG-DAC
Batch: August 2025

PART A

1. **echo "Hello, World!"** --- it print the statement in that Hello, World!

```
cdac@Shantu:~/VIFILE$ cat Hello.sh
#!/bin/bash

echo "Hello World...!!"

cdac@Shantu:~/VIFILE$ ./Hello.sh
Hello World...!!
cdac@Shantu:~/VIFILE$
```

2. **name= "Productive"** --- assign productive to the name for print

```
cdac@Shantu:~/VIFILE$ vi Name.sh
cdac@Shantu:~/VIFILE$ chmod +x Name.sh
cdac@Shantu:~/VIFILE$ ./Name.sh
Productive
cdac@Shantu:~/VIFILE$ cat Name.sh
#!/bin/bash

name="Productive"
echo $name
```

3. **touch file.txt** --- Create new file in directory

```
cdac@Shantu:~$ cd Assignment2
cdac@Shantu:~/Assignment2$ touch code.txt
cdac@Shantu:~/Assignment2$ ls
code.txt  partA.txt
cdac@Shantu:~/Assignment2$
```

4. **ls –a** --- Display all Hiden files

```
cdac@Shantu:~$ ls -a
.               .landscape    .sudo_as_admin_successful  S1.sh     g1.txt
..              .lesshst      .viminfo                   Shann     java
.bash_history   .local        Assignment2                VIFILE    program.sh
.bash_logout    .motd_shown   LinuxAssignment            cdac      s.sh
.bashrc         .profile      Part.txt                   edit.tt   shantanu
cdac@Shantu:~$
```

5. **rm file.txt** --- remove that file

```
cdac@Shantu:~/Assignment2$ ls
code.txt  partA.txt
cdac@Shantu:~/Assignment2$ rm partA.txt
cdac@Shantu:~/Assignment2$ ls
code.txt
cdac@Shantu:~/Assignment2$
```

6. **cp file1.txt file2.txt** --- replace the file2 data to file1

```
cdac@Shantu:~/Assignment2$ cat > file1.txt
Hello word is this ok for you to work with OS
cdac@Shantu:~/Assignment2$ cat > file2.txt
Hello boss your Doing CDAC from Kharghar
cdac@Shantu:~/Assignment2$ ls
code.txt  file1.txt  file2.txt
cdac@Shantu:~/Assignment2$ cp file1.txt file2.txt
cdac@Shantu:~/Assignment2$ cat file2.txt
Hello word is this ok for you to work with OS
cdac@Shantu:~/Assignment2$ cat file1.txt
Hello word is this ok for you to work with OS
```

7. **mv file.txt /path/to/directory/** --- Copy file from one to another directory

```
cdac@Shantu:~$ ls
Assignment2      Partc  Shann   directory1  java        shantanu
LinuxAssignment  Q2.sh  VIFILE  edit.tt     program.sh
Part.txt         S1.sh  cdac    g1.txt      s.sh
cdac@Shantu:~$ mv Part.txt /home/cdac/directory1
cdac@Shantu:~$ ls
Assignment2      Q2.sh  VIFILE      edit.tt  program.sh
LinuxAssignment  S1.sh  cdac        g1.txt   s.sh
Partc            Shann  directory1  java     shantanu
cdac@Shantu:~$ ls directory1
Part.txt  directory2
cdac@Shantu:~$
```

8. **Chmod 755 script** --- provide the permission for read/write/execute

```
cdac@Shantu:~/Assignment2$ ls -a
.  ..  code.txt  doc  file1.txt  file2.txt
cdac@Shantu:~/Assignment2$ ls -l
total 12
-rw-r--r-- 1 cdac cdac    0 Aug 20 16:49 code.txt
drwxr-xr-x 2 cdac cdac 4096 Aug 20 17:11 doc
-rw-r--r-- 1 cdac cdac   47 Aug 20 16:55 file1.txt
-rw-r--r-- 1 cdac cdac   47 Aug 20 16:56 file2.txt
cdac@Shantu:~/Assignment2$ chmod 755 code.txt
cdac@Shantu:~/Assignment2$ ls -l
total 12
-rwxr-xr-x 1 cdac cdac    0 Aug 20 16:49 code.txt
drwxr-xr-x 2 cdac cdac 4096 Aug 20 17:11 doc
-rw-r--r-- 1 cdac cdac   47 Aug 20 16:55 file1.txt
-rw-r--r-- 1 cdac cdac   47 Aug 20 16:56 file2.txt
cdac@Shantu:~/Assignment2$
```

9. **grep "pattern" file.txt** --- search text using that word pattern

A

```
cdac@Shantu:~/Assignment2$ cat file1.txt
Hello word is this ok for you to work with OS
cdac@Shantu:~/Assignment2$ grep "this" file1.txt
Hello word is this ok for you to work with OS
cdac@Shantu:~/Assignment2$
```

10. **kill PID** --- **terminate the process**

```
cdac@Shantu:~$ sleep 100&
[1] 391
cdac@Shantu:~$ kill 391
cdac@Shantu:~$
```

11. **mkdir mydir && cd mydir && touch file.txt && echo "Hello, World!" > file.txt && cat file.txt**

- mkdir mydir → Create a new directory called **mydir**.
- && → Run the next command **only if previous command succeeds**.
- cd mydir → Go inside **mydir**.
- touch file.txt → Create an empty file **file.txt**.
- echo "Hello, World!" > file.txt → Write "Hello, World!" inside **file.txt**.
- cat file.txt → Display the contents of **file.txt**.

```
cdac@Shantu:~/directory1$ mkdir mydir && cd mydir && touch file.txt && echo "Hello, World!" > file.txt && cat file.txt
Hello, World!
cdac@Shantu:~/directory1/mydir$ ls
file.txt
cdac@Shantu:~/directory1/mydir$
```

12.**ls -l | grep ".txt"** --- give details list of Directory | display only .txt file

```
cdac@Shantu:~$ ls -l |grep ".txt"
-rw-r--r-- 1 cdac cdac   41 Aug 20 16:16 Part.txt
-rwx---r-t 1 cdac cdac   15 Aug 19 18:40 g1.txt
```

13. **cat file1.txt file2.txt | sort | uniq** ---

```
cdac@Shantu:~/Assignment2$ cat file1.txt file2.txt | sort | uniq
Hello word is this ok for you to work with OS
```

14.**ls -l | grep "^d"** --- first it list of file |display final filter files d

```
cdac@Shantu:~/Assignment2$ ls -l | grep "^d"
drwxr-xr-x 2 cdac cdac 4096 Aug 20 17:11 doc
```

15.**grep -r "pattern" /path/to/directory/** --- **Search text pattern in directory**

```
cdac@Shantu:~$ grep -r "pattern" /home/cdac
/home/cdac/.bashrc:# If set, the pattern "**" used in a pathname expansion context will
```

16. **cat file1.txt file2.txt | sort | uniq –d** ---

```
cdac@Shantu:~/shantanu$ cat file.txt file3.txt | sort | uniq
Hello how are you
Hello its 2.5 am your not sleep
cdac@Shantu:~/shantanu$
```

17.**chmod 644 file.txt** --- change the file permissions
user – read & write | Group—read | others -- read

```
cdac@Shantu:~/Assignment2$ chmod 644 code.txt
cdac@Shantu:~/Assignment2$ ls -l
total 12
-rw-r--r-- 1 cdac cdac    0 Aug 20 16:49 code.txt
drwxr-xr-x 2 cdac cdac 4096 Aug 20 17:11 doc
-rw-r--r-- 1 cdac cdac   47 Aug 20 16:55 file1.txt
-rw-r--r-- 1 cdac cdac   47 Aug 20 16:56 file2.txt
cdac@Shantu:~/Assignment2$
```

18.**cp -r source_directory destination_directory ---**

copies entire source directory & its contents recursively into the destination directory.

```
cdac@Shantu:~$ cp -r shantanu backup/
cdac@Shantu:~$ ls backup
file.txt  file1.txt  file2.txt  file3.txt  java.txt  shantuu.txt
```

19. **find /path/to/search -name "*.txt"** --- find file name as .txt

```
cdac@Shantu:~$ find ~/ -name "*.txt"
/home/cdac/cdac/file5.txt
/home/cdac/cdac/num1.txt
/home/cdac/cdac/num.txt
/home/cdac/cdac/file1.txt
/home/cdac/cdac/file2.txt
/home/cdac/cdac/file3.txt
/home/cdac/cdac/file4.txt
/home/cdac/LinuxAssignment/docs/file2.txt
/home/cdac/LinuxAssignment/file1.txt
/home/cdac/java/program.txt
/home/cdac/java/aaa.txt
```

20.**chmod u+x file.txt --- user get execution permission**

```
cdac@Shantu:~/shantanu$ chmod u+x file1.txt
cdac@Shantu:~/shantanu$ ls -la
total 24
drwxr-xr-x  4 cdac cdac 4096 Aug 19 12:22 .
drwxr-x--- 13 cdac cdac 4096 Aug 21 19:58 ..
drwxr-xr-x  2 cdac cdac 4096 Aug 19 12:19 file1.txt
drwxr-xr-x  2 cdac cdac 4096 Aug 19 12:20 file2.txt
-rw-r--r--  1 cdac cdac  494 Aug 19 12:25 java.txt
-rw-r--r--  1 cdac cdac   96 Aug 19 12:22 shantuu.txt
cdac@Shantu:~/shantanu$
```

21.**echo $PATH --- print system environment variable**

```
cdac@Shantu:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/usr/lib/wsl/lib:/mnt/c/Python312/Scripts/:/mnt/c/Python312/:/mnt/c/windows/system32:/mnt/c/windows:/mnt/c/windows/System32/Wbem:/mnt/c/windows/System32/WindowsPowerShell/v1.0/:/mnt/c/windows/System32/OpenSSH/:/mnt/c/Program Files (x86)/NVIDIA Corporation/PhysX/Common:/mnt/c/Program Files/NVIDIA Corporation/NVIDIA NvDLISR:/mnt/c/WINDOWS/system32:/mnt/c/WINDOWS:/mnt/c/WINDOWS/System32/Wbem:/mnt/c/WINDOWS/System32/WindowsPowerShell/v1.0/:/mnt/c/WINDOWS/System32/OpenSSH/:/mnt/c/MinGW/bin:/mnt/c/Program Files/nodejs/:/mnt/c/ProgramData/chocolatey/bin:/mnt/c/Program Files/HP/HP One Agent:/mnt/c/Program Files/Git/cmd:/mnt/c/Program Files/Java/jdk-22/bin:/mnt/c/Program Files/PowerShell/7-preview/preview:/mnt/c/MinGW/bin:/mnt/c/Program Files/PowerShell/7/:/mnt/c/Program Files/MySQL/MySQL Shell 8.0/bin/:/mnt/c/Users/shant/AppData/Local/Microsoft/WindowsApps:/mnt/c/Users/shant/AppData/Roaming/npm:/mnt/c/Users/shant/AppData/Local/Programs/Microsoft VS Code/bin:/snap/bin
```

PART-B

Identify True or False:

1. **ls** is used to list files and directories in a directory. ----- TRUE
2. **mv** is used to move files and directories. ---------- TRUE
3. **cd** is used to copy files and directories. ---------- FALSE
4. **pwd** stands for "print working directory" and displays the current directory. --- TRUE
5. **grep** is used to search for patterns in files. ---------- TRUE
6. **chmod 755 file.txt** gives read, write, and execute permissions to the owner, and read and execute permissions to group and others. ---------- TRUE
7. **mkdir -p directory1/directory2** creates nested directories, creating directory2 inside directory1 if directory1 does not exist. ---------- TRUE
8. **rm -rf file.txt** deletes a file forcefully without confirmation ---------- TRUE

Identify the Incorrect Commands:

1. **chmodx** is used to change file permissions. ------- Incorrect
   - Correct is -- chmod

2. **cpy** is used to copy files and directories. ------- Incorrect
   - Correct is -- cp is used for copy

3. **mkfile** is used to create a new file. ------- Incorrect
   - Correct is – mkdir is used for create new directory

4. **catx** is used to concatenate files. ------- Incorrect
   - Correct is -- cat file1.txt file2.txt > merged.txt

5. **rn** is used to rename files. ------- Incorrect

   - Correct is – (mv oldname.txt newname.txt) used for rename

Part C

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

```
cdac@Shantu:~/Assignment2/Partc$ vi Q1.sh
cdac@Shantu:~/Assignment2/Partc$ chmod +x Q1.sh
cdac@Shantu:~/Assignment2/Partc$ ./Q1.sh
Hello World!
cdac@Shantu:~/Assignment2/Partc$
```

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

```
echo $name
cdac@Shantu:~/Assignment2/Partc$ vi Q2.sh
cdac@Shantu:~/Assignment2/Partc$ ./Q2.sh
CDAC Mumbai
cdac@Shantu:~/Assignment2/Partc$ cat Q2.sh
#!/bin/bash

name="CDAC Mumbai"
echo $name
```

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

```
cdac@Shantu:~/Assignment2/Partc$ vi Q3.sh
cdac@Shantu:~/Assignment2/Partc$ chmod +x Q3.s
cdac@Shantu:~/Assignment2/Partc$ ./Q3.sh
12 45 74
val1 is 12
val2 is 45
val3 is 74
cdac@Shantu:~/Assignment2/Partc$ cat Q3.sh
#!/bin/bash

var1=a var2=b var3=c

read var1 var2 var3

echo val1 is $var1
echo val2 is $var2
echo val3 is $var3
```

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

```
cdac@Shantu:~/Assignment2/Partc$ vi Q4.sh
cdac@Shantu:~/Assignment2/Partc$ chmod +x Q4.sh
cdac@Shantu:~/Assignment2/Partc$ ./Q4.sh
Enter First number:12
Enter Second number:12
Addition of two number is: 24
cdac@Shantu:~/Assignment2/Partc$ cat Q4.sh
#!/bin/bash

echo -n "Enter First number:"
read a

echo -n "Enter Second number:"
read b
((Sum=a+b))

echo "Addition of two number is: $Sum"

cdac@Shantu:~/Assignment2/Partc$
```

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

```
cdac@Shantu:~/Assignment2/Partc$ ./Q5.sh
Enter Number
12
Even Number
cdac@Shantu:~/Assignment2/Partc$ ./Q5.sh
Enter Number
1
ODD Number
cdac@Shantu:~/Assignment2/Partc$ cat Q5.sh
#!/bin/bash

echo "Enter Number"
read num

if [ $((num % 2)) -eq 0 ];then
        echo "Even Number"

else
        echo "ODD Number"
fi
cdac@Shantu:~/Assignment2/Partc$
```

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

```
cdac@Shantu:~/Assignment2/Partc$ chmod +x Q6.sh
cdac@Shantu:~/Assignment2/Partc$ ./Q6.sh
1
2
3
4
5
cdac@Shantu:~/Assignment2/Partc$ cat Q6.sh
#!/bin/bash

for i in {1..5}
do
        echo $i
done
```

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

```
cdac@Shantu:~/Assignment2/Partc$ vi Q7.sh
cdac@Shantu:~/Assignment2/Partc$ ./Q7.sh
1
2
3
4
5
cdac@Shantu:~/Assignment2/Partc$ cat Q7.sh
#!/bin/bash
i=1
while [ $i -le 5 ]
do
    echo $i
    i=$((i + 1))
done
```

.

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".

```
cdac@Shantu:~/Assignment2/Partc$ ./Q8.sh
Exist
cdac@Shantu:~/Assignment2/Partc$ cat Q8.sh
#!/bin/bash

if [ -f "Q8.sh" ];then
        echo "Exist"
else
        echo "Not Exist"
fi
cdac@Shantu:~/Assignment2/Partc$
```

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.

```
cdac@Shantu:~/Assignment2/Partc$ vi Q9.sh
cdac@Shantu:~/Assignment2/Partc$ chmod +x Q9.sh
cdac@Shantu:~/Assignment2/Partc$ ./Q9.sh
Entern Number
15
Greater than 10
cdac@Shantu:~/Assignment2/Partc$ ./Q9.sh
Entern Number
5
Less than 10
cdac@Shantu:~/Assignment2/Partc$
```

```
cdac@Shantu:~/Assignment2/Partc$ cat Q10.sh
#!/bin/bash

for var1 in 1 2 3 4 5
do
        for var2 in {1..10}

        do
                echo $((var1 * var2))
        done
        echo
done
```

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

```
cdac@Shantu:~/Assignment2/Partc$ cat Q10.sh
#!/bin/bash

for var1 in 1 2 3 4 5
do
        for var2 in {1..10}

        do
                echo $((var1 * var2))
        done
        echo
done
```

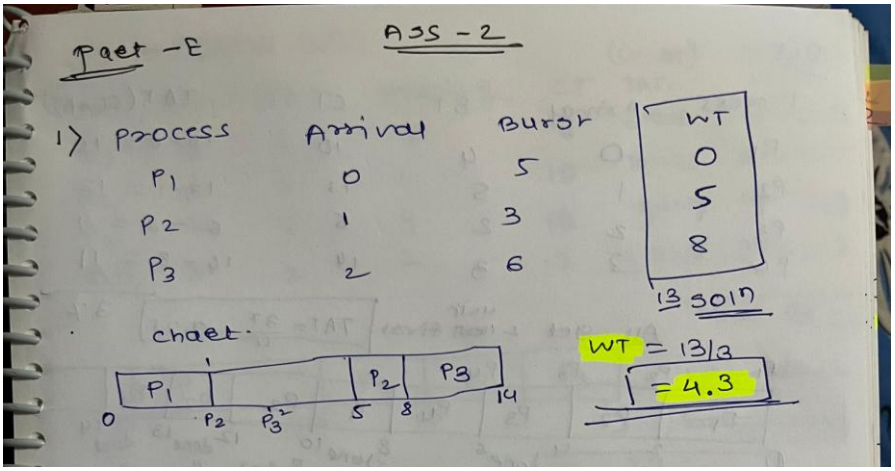
Question 11: Write a shell script that uses a while loop to read numbers from the user until the user enters a negative number. For each positive number entered, print its square. Use the **break** statement to exit the loop when a negative number is entered.

```
cdac@Shantu:~/Assignment2/Partc$ vi Q11.sh
cdac@Shantu:~/Assignment2/Partc$ ./Q11.sh
Enter Number:
2
the Square of 2 is : 4
Enter Number:
-1
Negative Number is Enter
cdac@Shantu:~/Assignment2/Partc$
```

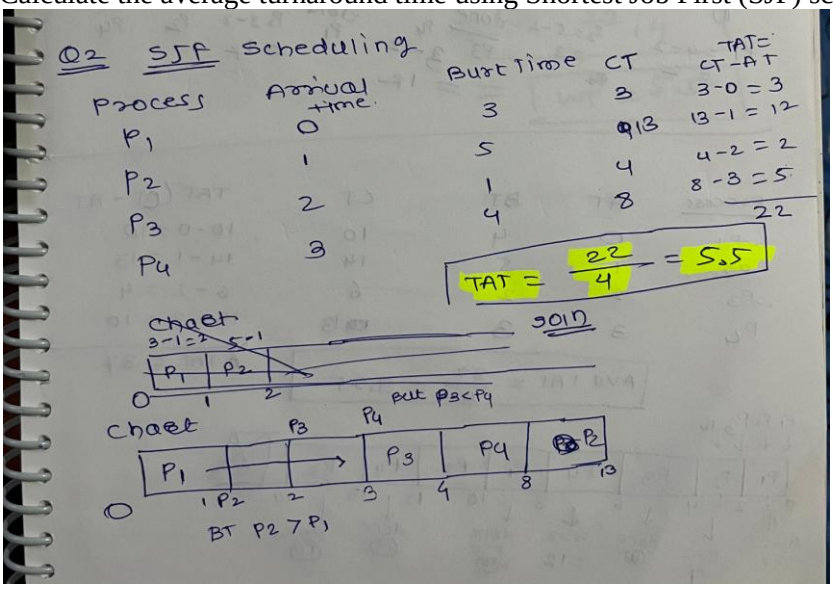
```
cdac@Shantu:~/Assignment2/Partc$ cat Q11.sh
#!/bin/bash

while true
do

echo "Enter Number:"
read num

if [ $num -lt 0 ]; then
        echo "Negative Number is Enter"
        break
fi
         square=$((num*num))
         echo "the Square of $num is : $square"

done
```

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.



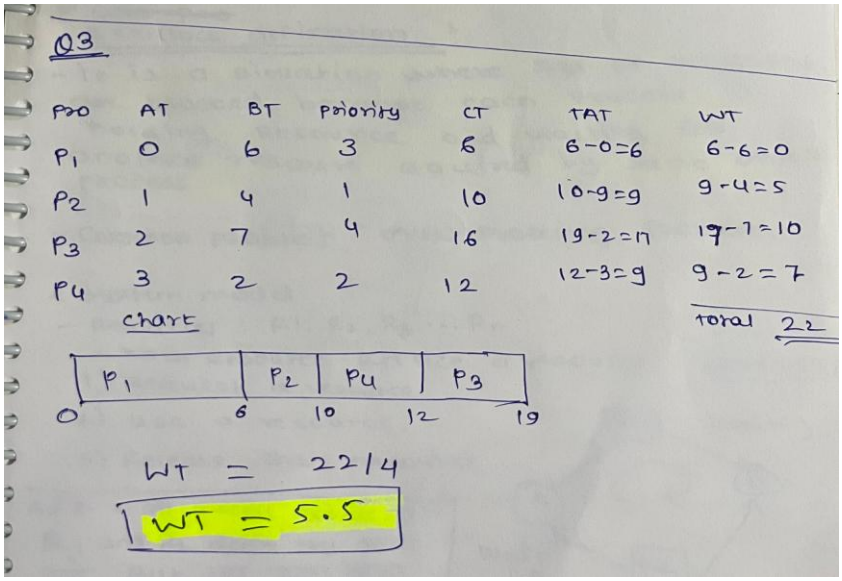
2. Consider the following processes with arrival times and burst times:
Process	Arrival Time	Burst Time
P1	0	3
P2	1	5
P3	2	1
P4	3	4
Calculate the average turnaround time using Shortest Job First (SJF) scheduling.



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

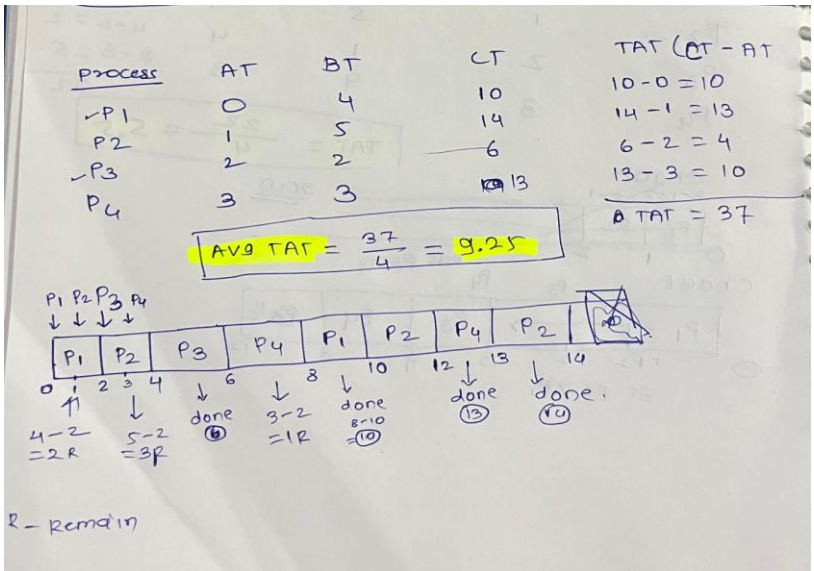
Calculate the average waiting time using Priority Scheduling.



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.



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?