Q.1.Write shell program to add two numbers.

Program:

```
read -p "Enter first number: " num1
read -p "Enter second number:" num2
sum=$((num1+num2))
echo "The sum of $num1 and $num2 is: "$sum
```

Output:

```
~/Studies/6thSem/os/os_lab/os_lab_2 remote_branch:main ↑6 ?2
❯ ./add_two_num.sh
Enter first number: 33
Enter second number:-11
The sum of 33 and -11 is: 22
```

Discussion:

In this question, first num1 and num2 were prompted to enter using the -p flag in read command. The sum was calculated using $((num1+num2))and displayed using the echo command.

Q. 2.Write shell program to find the maximum of three numbers.

Program:

```
#!/bin/bash
echo "Enter 3 numbers:"
read -p "First number: " a # -p is for prompt display
read -p "Second number: " b
read -p "Third number: " c

# Mind the space inside if condition check
if [ $a -gt $b -a $a -gt $c ]; then # -gt is greater than
    echo $a" is the greatest."
elif [ $b -gt $c -a $b -gt $a ]; then
    echo $b" is the greatest."
else
    echo $c" is the greatest."
fi

```

Output:

```
~/Studies/6thSem/os/os_lab/os_lab_2 remote_branch:main ↑6 ?2
❯ ./max_of_3_numbers.sh
Enter 3 numbers:
First number: 33
Second number: 68
Third number: -99
68 is the greatest.
```

Discussion:
In this question, three numbers were prompted to enter and compared using -gt for greater than, -a for using if commands. We learnt about how to use the if command, especially that we should include space inside the if command condition.

Q. 3.Write shell program to concatenate two strings.
Program:

```
1 #!/bin/bash
2
3 #Define strings
4 str1="Hello, " # Remember, no space used for assign operation
5 str2="World!"
6 concatenated=${str1}${str2}
7
8 #Print the concatenated string
9 echo $concatenated
```

Output:

```
~/Studies/6thSem/os/os_lab/os_lab_2 remote_branch:main ↑6 ?2
❯ ./concatenate_strings.sh
Hello, World!
```

Discussion:
In this question, concatenation of two strings using the writing two strings consecutively method was performed. We could have also used the + operator to concatenate two strings. And then, the concatenated string was displayed.

Q. 4.Write shell program to display the nth term of the fibonacci sequence.
Program:

```bash
#!/bin/bash

echo "Enter the number of fibonacci numbers to display: "
read num_of_terms
a=0
b=1
counter=2

echo "Fibonacci series upto $num_of_terms terms:"
echo -n "$a, $b" # -n is to display without newline at last
while [ $counter -lt $num_of_terms ]; do

        #Calculate next_term
        next_term=$((a+b)) # Use $(()) to calculate and assign
        echo -n ", $next_term"

        #Update value
        a=$b
        b=$next_term
        counter=$((counter+1))
done
echo "" #New line after the series
```

Output:

```
~/Studies/6thSem/os/os_lab/os_lab_2 remote_branch:main ↑6 ?2
❯ ./fibonacci_series.sh
Enter the number of fibonacci numbers to display:
10
Fibonacci series upto 10 terms:
0, 1, 1, 2, 3, 5, 8, 13, 21, 34
```

Discussion:

In this question, a counter was used to track the number of fibonacci numbers that are displayed. Similarly, -n flag is used with echo command to display the numbers without newline at the end. -lt flag is used inside the if command for less than instruction. The variable next_item was calculated using addition between last two numbers a and b & a was changed to value of b and b was changed to value of next_term in each iteration.