Laboratory Assignments 3
Subject: Design Principles of Operating Systems
Subject code: CSE 3249

Assignment 3: Shell Programming using user defined variables, arithmetic operators, conditional statements.

Objective of this Assignment:

- To learn the proper use of user defined variables and arithmetic operators in shell programming.
- To write shell script producing solution to decision making problems.

1. Write a shell script **iaop** to perform integer arithmetic on two numbers, where the value of the two numbers will be given during runtime.

OUTPUT:

```
student@C-126-C045: ~/DOS_2241013076
student@C-126-C045:~/DOS_2241013076$ cat > iaop.sh << 'EOF'
> echo "Enter the first number: "
read num1
echo "Enter the second number: "
read num2

sum=$((num1 + num2))
difference=$((num1 - num2))
product=$((num1 * num2))


if [ $num2 -ne 0 ]; then
    quotient=$((num1 / num2))
    echo "The quotient of $num1 divided by $num2 is: $quotient"
else
    echo "Cannot divide by zero."
fi

echo "The sum of $num1 and $num2 is: $sum"
echo "The difference between $num1 and $num2 is: $difference"
echo "The product of $num1 and $num2 is: $product"
> EOF
student@C-126-C045:~/DOS_2241013076$ chmod +x iaop.sh
student@C-126-C045:~/DOS_2241013076$ ./iaop.sh
Enter the first number:
40
Enter the second number:
39
The quotient of 40 divided by 39 is: 1
The sum of 40 and 39 is: 79
The difference between 40 and 39 is: 1
The product of 40 and 39 is: 1560
```

2. Write a shell script **faop** to perform floating point arithmetic on two numbers, where the value of the two numbers will be given during runtime.

OUTPUT:

```
student@C-126-C045: ~/DOS_2241013076
student@C-126-C045:~/DOS_2241013076$ cat > faop.sh << 'EOF'
> echo "Enter the first floating point number: "
> read num1
> echo "Enter the second floating point number: "
> read num2
>
> sum=$(echo "$num1 + $num2" | bc)
> difference=$(echo "$num1 - $num2" | bc)
> product=$(echo "$num1 * $num2" | bc)
> if [ "$(echo "$num2 == 0" | bc)" -eq 1 ]; then
> echo "Cannot divide by zero."
> else
> quotient=$(echo "$num1 / $num2" | bc)
> echo "The quotient of $num1 divided by $num2 is: $quotient"
> fi
> echo "The sum of $num1 and $num2 is: $sum"
> echo "The difference between $num1 and $num2 is: $difference"
> echo "The product of $num1 and $num2 is: $product"
> EOF
student@C-126-C045:~/DOS_2241013076$ chmod +x faop.sh
student@C-126-C045:~/DOS_2241013076$ ./faop.sh
Enter the first floating point number:
15.6
Enter the second floating point number:
2.5
The quotient of 15.6 divided by 2.5 is: 6
The sum of 15.6 and 2.5 is: 18.1
The difference between 15.6 and 2.5 is: 13.1
The product of 15.6 and 2.5 is: 39.0
```

3. Ramesh's basic salary is input through the keyboard. His dearness allowance is 40% of basic salary, and house rent allowance is 20% of basic salary. Write a program to calculate his gross salary.

OUTPUT:

```
student@C-126-C045: ~/DOS_2241013076
student@C-126-C045:~/DOS_2241013076$ cat > calculate_salary.sh << 'EOF'
> echo "Enter Ramesh's basic salary: "
> read basic_salary
> da=$(echo "scale=2; $basic_salary * 0.4" | bc)
> hra=$(echo "scale=2; $basic_salary * 0.2" | bc)
> gross_salary=$(echo "scale=2; $basic_salary + $da + $hra" | bc)
> echo "Ramesh's Basic Salary: $basic_salary"
> echo "Dearness Allowance (DA): $da"
> echo "House Rent Allowance (HRA): $hra"
> echo "Gross Salary: $gross_salary"
> EOF
student@C-126-C045:~/DOS_2241013076$ chmod +x calculate_salary.sh
student@C-126-C045:~/DOS_2241013076$ ./calculate_salary.sh
Enter Ramesh's basic salary:
123000
Ramesh's Basic Salary: 123000
Dearness Allowance (DA): 49200.0
House Rent Allowance (HRA): 24600.0
Gross Salary: 196800.0
```

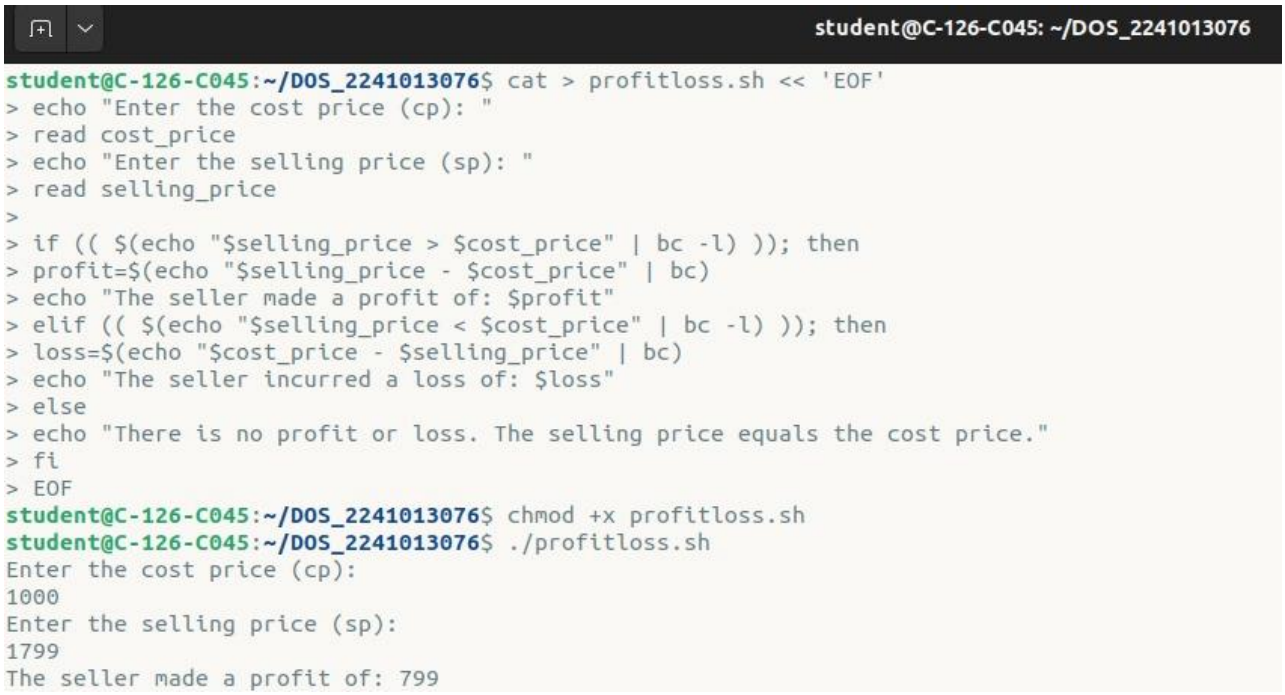
4. If a five digit number is input given through the keyboard during runtime, write a program to calculate the sum of its digits.

OUTPUT:

```
student@C-126-C045: ~/DOS_2241013076
student@C-126-C045:~/DOS_2241013076$ cat > SumOfDigits.sh << 'EOF'
> echo "Enter a five digit number: "
> read number
>
> if [[ ! $number =~ ^[0-9]{5}$ ]]; then
> echo "Invalid input. Please enter a five-digit number."
> exit 1
> fi
> sum=0
> for (( i=0; i<${#number}; i++ )); do
> digit=${number:i:1}
> sum=$((sum + digit))
> done
> echo "The sum of the digits of $number is: $sum"
> EOF
student@C-126-C045:~/DOS_2241013076$ chmod +x SumOfDigits.sh
student@C-126-C045:~/DOS_2241013076$ ./SumOfDigits.sh
Enter a five digit number:
12345
The sum of the digits of 12345 is: 15
```

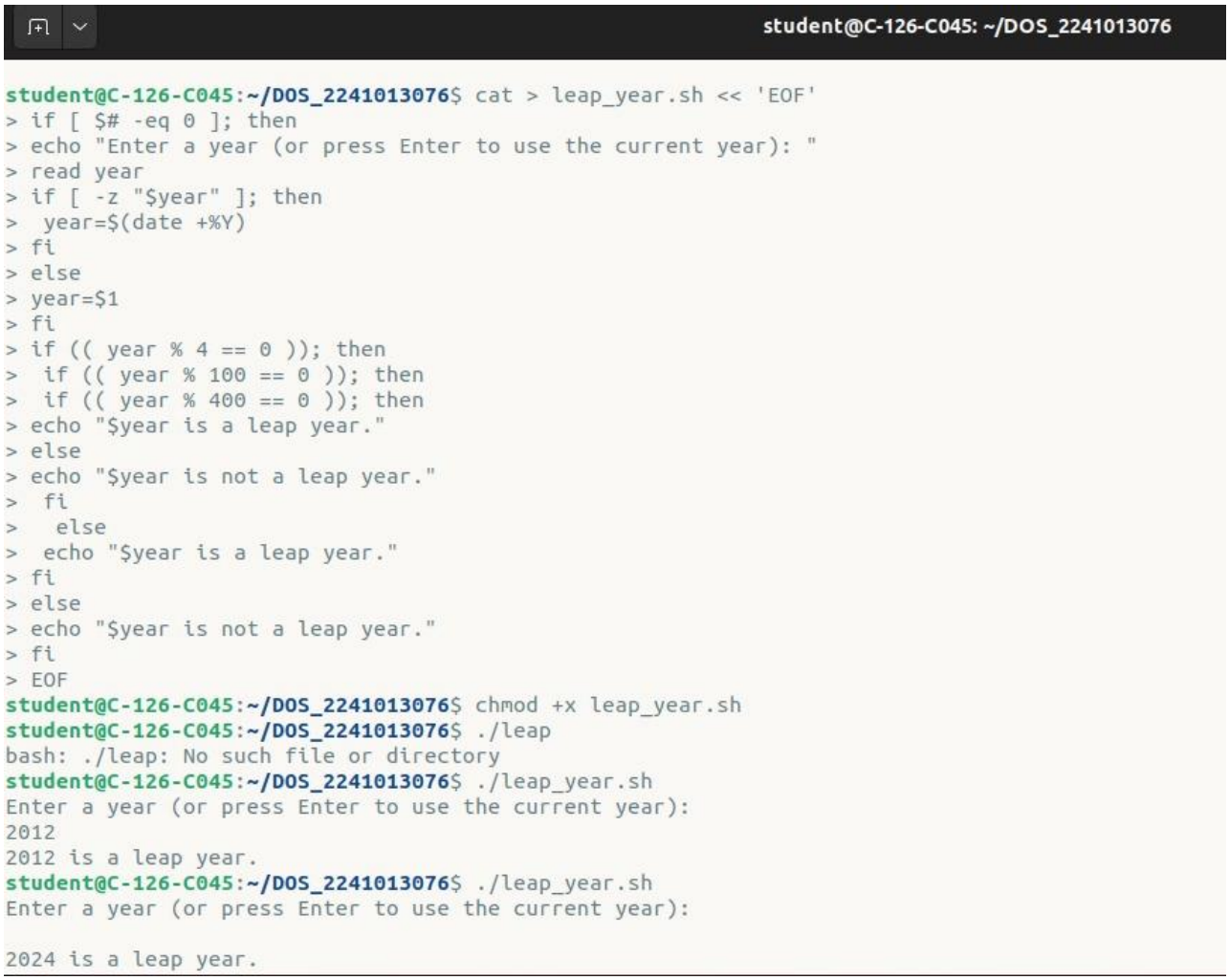
5. If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit was made or loss incurred.

OUTPUT:



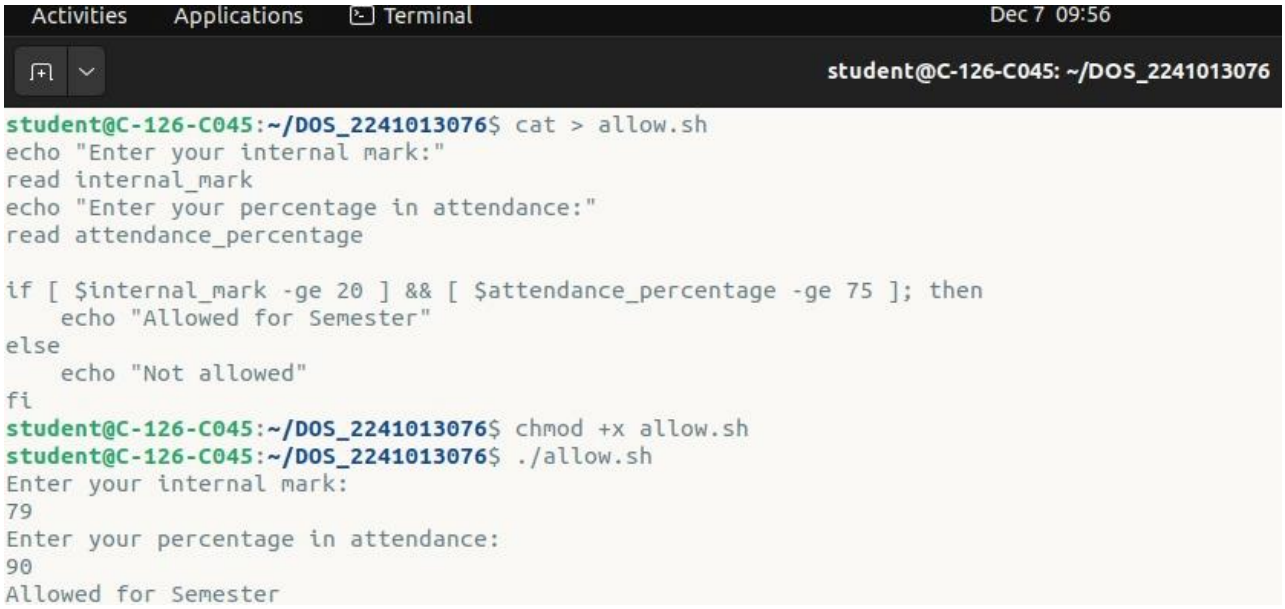
6. Write a shell script which receives any year from the keyboard and determines, whether the year is a leap year or not. If no argument is supplied the current year should be assumed.

OUTPUT:



7. Write a shell script **allow** that will display a message to enter internal mark and percentage in attendance, if the entered mark is greater than equal to 20 and entered percentage in attendance is greater that equal to 75 then display the message Allowed for Semester otherwise display the message Not allowed.

OUTPUT:



8. Write a shell script small3 that will compare three numbers passed as command line arguments and display the smallest one.

OUTPUT:

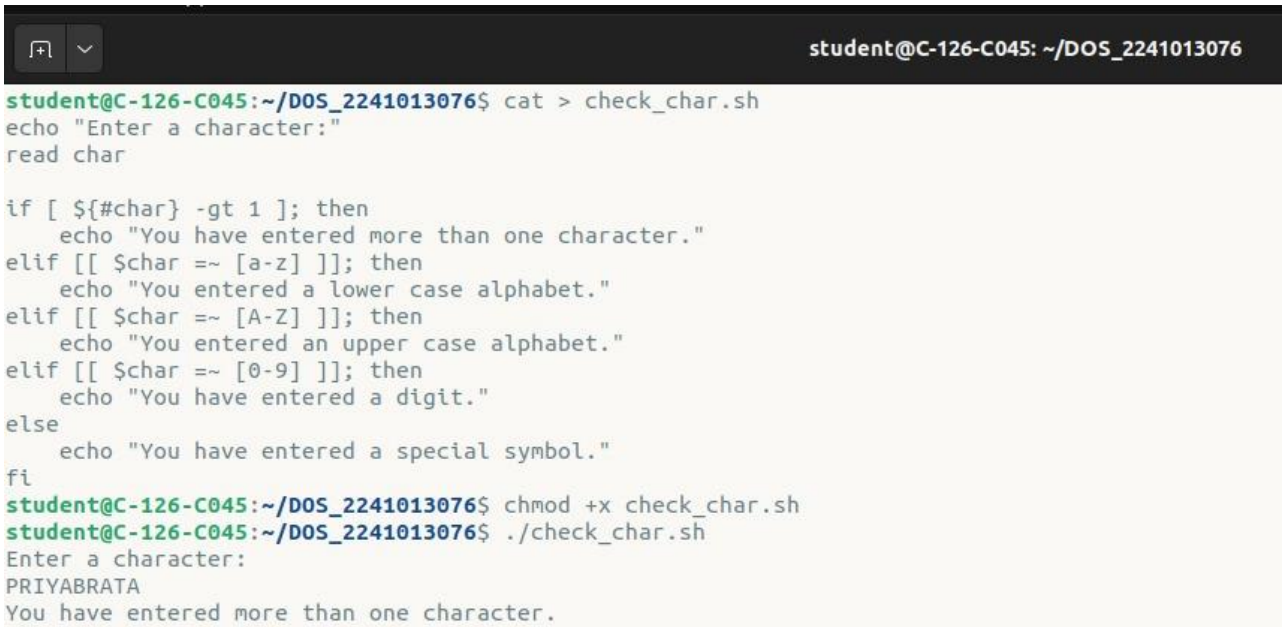
```
student@C-126-C045:~/DOS_2241013076$ cat > small3.sh
if [ $# -ne 3 ]; then
    echo "Please provide exactly three numbers as arguments."
    exit 1
fi

num1=$1
num2=$2
num3=$3

if [ $num1 -le $num2 ] && [ $num1 -le $num3 ]; then
    echo "The smallest number is: $num1"
elif [ $num2 -le $num1 ] && [ $num2 -le $num3 ]; then
    echo "The smallest number is: $num2"
else
    echo "The smallest number is: $num3"
fi
student@C-126-C045:~/DOS_2241013076$ chmod +x small3.sh
student@C-126-C045:~/DOS_2241013076$ ./small3.sh 48 39 22
The smallest number is: 22
```

9. Write a shell script **check_char** which will display one message to enter a character and according to the character entered it will display appropriate message from the following options:
    - You entered a lower case alphabet
    - You entered an upper case alphabet.
    - You have entered a digit.
    - You have entered a special symbol.
    - You have entered more than one character.

OUTPUT:

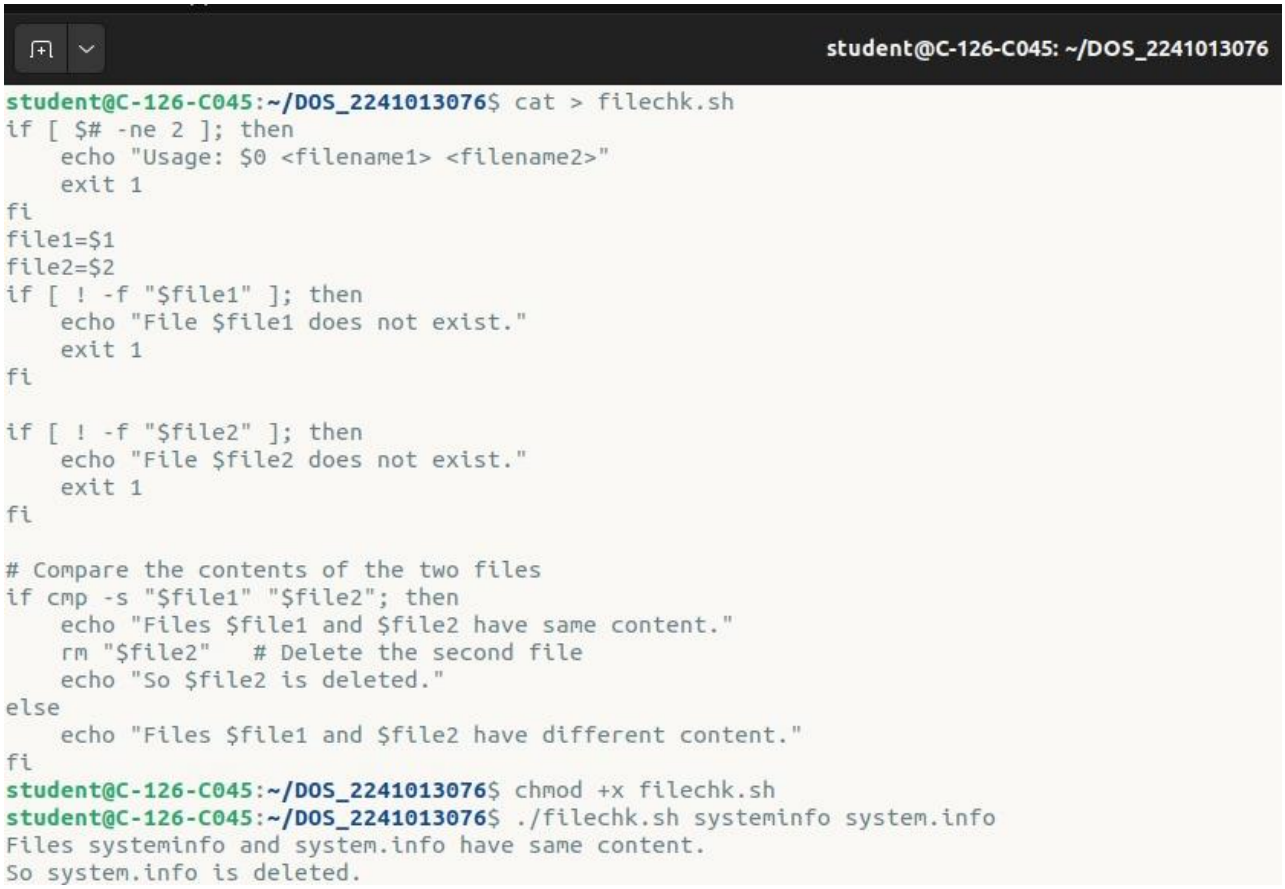


10. Write a shell script **class_time** which will display one message to enter a day and according to the day entered it will display the DOS class time along with the room information or the message “No class on day_name” or “Holiday” for Sunday.

OUTPUT:

11. Write a shell script **filechk** that will take two file names as command line arguments, and check whether the content of two files are same or not . If contents of two files are same, then it will display the message: Files filename1 and filename2 have same content.
then delete the second file
and display the message: So filename2 is deleted.
Otherwise display the message: Files filename1 and filename2 have different content.

OUTPUT:



12. Write a shell script **calculator** that will take three command line arguments, where the first argument will specify the first operand, second argument will specify the operator and the third argument will specify the second operand and display the output of the arithmetic operation specified in the following format: op1 operator op2 = result .

    If the arguments will be passed in any other sequence, it will display the message:

    "Invalid input "

    Enter input in following format: op1 operator op2

    The symbols to be used for different operators are as follows:

Addition:	+	Subtraction:	-
Multiplication:	x	Division:	/
Modulo:	%	Exponent:	^

OUTPUT:

```
student@C-126-C045: ~/DOS_2241013076
student@C-126-C045:~/DOS_2241013076$ cat > calculator.sh
if [ $# -ne 3 ]; then
    echo "Invalid input. Enter input in the following format: op1 operator op2"
    exit 1
fi
op1=$1
operator=$2
op2=$3

if ! [[ "$op1" =~ ^-?[0-9]+(\.[0-9]+)?$ ]] || ! [[ "$op2" =~ ^-?[0-9]+(\.[0-9]+)?$ ]]; then
    echo "Invalid input. Operands must be numbers."
    exit 1
fi

case $operator in
    +)
        result=$(echo "$op1 + $op2" | bc)
        ;;
    -)
        result=$(echo "$op1 - $op2" | bc)
        ;;
    x)
        result=$(echo "$op1 * $op2" | bc)
        ;;
    /)
        if [ "$op2" == "0" ]; then
            echo "Error: Division by zero is not allowed."
            exit 1
        fi
        result=$(echo "$op1 / $op2" | bc -l)
        ;;
    %)
        result=$(echo "$op1 % $op2" | bc)
        ;;
```

```
        if [ "$op2" == "0" ]; then
            echo "Error: Division by zero is not allowed."
            exit 1
        fi
        result=$(echo "$op1 / $op2" | bc -l)
        ;;
    %)
        result=$(echo "$op1 % $op2" | bc)
        ;;
    ^)
        result=$(echo "$op1 ^ $op2" | bc)
        ;;
    *)
        echo "Invalid input. Enter input in the following format: op1 operator op2"
        exit 1
        ;;
esac

echo "$op1 $operator $op2 = $result"
student@C-126-C045:~/DOS_2241013076$ chmod +x calculator.sh
student@C-126-C045:~/DOS_2241013076$ ./calculator.sh 10 + 5
10 + 5 = 15
student@C-126-C045:~/DOS_2241013076$ ./calculator.sh 10 - 5
10 - 5 = 5
student@C-126-C045:~/DOS_2241013076$ ./calculator.sh 10 x 5
10 x 5 = 50
student@C-126-C045:~/DOS_2241013076$ ./calculator.sh 10 / 2
10 / 2 = 5.0000000000000000000
student@C-126-C045:~/DOS_2241013076$ ./calculator.sh 10 / 0
Error: Division by zero is not allowed.
student@C-126-C045:~/DOS_2241013076$ ./calculator.sh 10 % 3
10 % 3 = 1
student@C-126-C045:~/DOS_2241013076$ ./calculator.sh 2 ^ 3
2 ^ 3 = 8
```