Solution of Lab 1 Journal

Lab Journal 1-B

1. Open IDLE and run the following program. Try different integer values for separate runs of the program. Play around with the indentation of the program lines of code and run it again. See what happens. Make a note of what changes you made and how it made the program behave. Also note any errors, as well as the changes you need to make to remove the errors.

In [13]:

```python
x = input("Please enter an integer: ")
x= int(x)
print(x)
if x < 0:
    x = 0
    print('Negative changed to zero')
elif x == 0:
    print('Zero')
elif x == 1:
    print('Single')
else:
    print('More')
```

```
Please enter an integer: 0
0
Zero
```

Lab Journal 1-C:

2. Write a simple calculator program. Follow the steps below:

a. Declare and define a function named Menu which displays a list of choices for user such as addition, subtraction, multiplication, & classic division. It takes the choice from user as an input and return.

b. Define and declare a separate function for each choice.

c. In the main body of the program call respective function depending on user's choice.

d. Program should not terminate till user chooses option to—Quit‖.

In [9]:

```python
def Menu():
    print("Calculator Menu\n")
    print("1. Addition")
    print("2. Subtraction")
    print("3. Multiplication")
    print("4. Classic Division")
    print("5. Quit\n")
    choice = int(input("Enter your choice (1-5): "))
    return choice

def add():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    print(num1, "+", num2, "=", num1 + num2)

def subtract():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    print(num1, "-", num2, "=", num1 - num2)

def multiply():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    print(num1, "*", num2, "=", num1 * num2)

def divide():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    if num2 == 0:
        print("Error: Cannot divide by zero")
    else:
        print(num1, "/", num2, "=", num1 / num2)

while True:
    choice = Menu()
    if choice == 1:
        add()
    elif choice == 2:
        subtract()
    elif choice == 3:
        multiply()
    elif choice == 4:
        divide()
    elif choice == 5:
        break
    else:
        print("Invalid choice. Please try again.\n")
```

```
Calculator Menu

1. Addition
2. Subtraction
3. Multiplication
4. Classic Division
5. Quit

Enter your choice (1-5): 3
Enter first number: 2
Enter second number: 4
2.0 * 4.0 = 8.0
Calculator Menu

1. Addition
2. Subtraction
3. Multiplication
4. Classic Division
5. Quit

Enter your choice (1-5): 5
```

3. Write a unit conversion calculator program in in python. Follow the steps given below:

a. Declare and define a function named Menu which displays a list of choices for user such as meter to km, km to m, centimetre to meter, & centime to millimetre. It takes the choice from user as an input and return.

b. Define and declare a separate function for each choice.

c. In the main body of the program call respective function depending on user's choice.

d. Program should not terminate till user chooses option to—Quit‖.

In [10]:

```python
def Menu():
    print("Unit Conversion Menu\n")
    print("1. Convert meters to kilometers")
    print("2. Convert kilometers to meters")
    print("3. Convert centimeters to meters")
    print("4. Convert centimeters to millimeters")
    print("5. Quit\n")
    choice = int(input("Enter your choice (1-5): "))
    return choice

def meters_to_km():
    meters = float(input("Enter distance in meters: "))
    km = meters / 1000
    print(meters, "meters =", km, "kilometers")

def km_to_meters():
    km = float(input("Enter distance in kilometers: "))
    meters = km * 1000
    print(km, "kilometers =", meters, "meters")

def cm_to_meters():
    cm = float(input("Enter length in centimeters: "))
    meters = cm / 100
    print(cm, "centimeters =", meters, "meters")

def cm_to_mm():
    cm = float(input("Enter length in centimeters: "))
    mm = cm * 10
    print(cm, "centimeters =", mm, "millimeters")

while True:
    choice = Menu()
    if choice == 1:
        meters_to_km()
    elif choice == 2:
        km_to_meters()
    elif choice == 3:
        cm_to_meters()
    elif choice == 4:
        cm_to_mm()
    elif choice == 5:
        break
    else:
        print("Invalid choice. Please try again.\n")
```

```
Unit Conversion Menu

1. Convert meters to kilometers
2. Convert kilometers to meters
3. Convert centimeters to meters
4. Convert centimeters to millimeters
5. Quit

Enter your choice (1-5): 1
Enter distance in meters: 5
5.0 meters = 0.005 kilometers
Unit Conversion Menu

1. Convert meters to kilometers
2. Convert kilometers to meters
3. Convert centimeters to meters
4. Convert centimeters to millimeters
5. Quit

Enter your choice (1-5): 5
```

Bonus Lab Task (Extra Credit):

In [14]:

```python
import math

def Menu():
    print("Calculator Menu\n")
    print("1. Add")
    print("2. Subtract")
    print("3. Multiply")
    print("4. Divide")
    print("5. Factorial")
    print("6. x^y")
    print("7. log")
    print("8. ln")
    print("9. Quit\n")
    choice = int(input("Enter your choice (1-9): "))
    return choice

def add():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    result = num1 + num2
    print(num1, "+", num2, "=", result)

def subtract():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    result = num1 - num2
    print(num1, "-", num2, "=", result)

def multiply():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    result = num1 * num2
    print(num1, "*", num2, "=", result)

def divide():
    num1 = float(input("Enter first number: "))
    num2 = float(input("Enter second number: "))
    if num2 == 0:
        print("Error: Cannot divide by zero!")
    else:
        result = num1 / num2
        print(num1, "/", num2, "=", result)

def factorial():
    num = int(input("Enter a positive integer: "))
    if num < 0:
        print("Error: Cannot find factorial of a negative number!")
    else:
        result = math.factorial(num)
        print(num, "! =", result)

def x_power_y():
    x = float(input("Enter the base number: "))
    y = float(input("Enter the exponent: "))
    result = x ** y
    print(x, "^", y, "=", result)

def logarithm():
    x = float(input("Enter the number: "))
    base = float(input("Enter the base: "))
    result = math.log(x, base)
    print("log", base, "(", x, ") =", result)

def natural_logarithm():
    x = float(input("Enter the number: "))
    result = math.log(x)
    print("ln(", x, ") =", result)

while True:
    choice = Menu()
    if choice == 1:
        add()
    elif choice == 2:
        subtract()
    elif choice == 3:
        multiply()
    elif choice == 4:
        divide()
```

```
        elif choice == 5:

            factorial()
        elif choice == 6:
            x_power_y()
        elif choice == 7:
            logarithm()
        elif choice == 8:
            natural_logarithm()
        elif choice == 9:
            break
        else:
            print("Invalid choice. Please try again.\n")
```

```
Calculator Menu

1. Add
2. Subtract
3. Multiply
4. Divide
5. Factorial
6. x^y
7. log
8. ln
9. Quit

Enter your choice (1-9): 7
Enter the number: 2
Enter the base: 5
log 5.0 ( 2.0 ) = 0.43067655807339306
Calculator Menu

1. Add
2. Subtract
3. Multiply
4. Divide
5. Factorial
6. x^y
7. log
8. ln
9. Quit

Enter your choice (1-9): 9
```

Lab Journal 1-D:

1) Create a class name basic_calc with following attributes and methods; Two integers (values are passed with instance creation)

Different methods such as addition, subtraction, division, multiplication

Create another class inherited from basic_calc named s_calc which should have the following additional methods;

Factorial, x_power_y,log, ln etc

In [15]:

```python
import math

class basic_calc:
    def __init__(self, num1, num2):
        self.num1 = num1
        self.num2 = num2

    def add(self):
        return self.num1 + self.num2

    def subtract(self):
        return self.num1 - self.num2

    def multiply(self):
        return self.num1 * self.num2

    def divide(self):
        if self.num2 == 0:
            return "Error: Cannot divide by zero!"
        else:
            return self.num1 / self.num2

class s_calc(basic_calc):
    def factorial(self):
        if self.num1 < 0:
            return "Error: Cannot find factorial of a negative number!"
        else:
            return math.factorial(self.num1)

    def x_power_y(self):
        return self.num1 ** self.num2

    def log(self):
        return math.log(self.num1, self.num2)

    def ln(self):
        return math.log(self.num1)
```

In [16]:

```python
def main():
    # Creating an instance of the basic_calc class
    calc = basic_calc(10, 5)

    # Performing basic operations
    print("Addition:", calc.add())
    print("Subtraction:", calc.subtract())
    print("Multiplication:", calc.multiply())
    print("Division:", calc.divide())

    # Creating an instance of the s_calc class
    scalc = s_calc(6, 3)

    # Performing advanced operations
    print("Factorial:", scalc.factorial())
    print("x_power_y:", scalc.x_power_y())
    print("log:", scalc.log())
    print("ln:", scalc.ln())

if __name__ == '__main__':
    main()
```

```
Addition: 15
Subtraction: 5
Multiplication: 50
Division: 2.0
Factorial: 720
x_power_y: 216
log: 1.6309297535714573
ln: 1.791759469228055
```