## 1. Write a Python program to calculate the area of a rectangle given its length and width.

```python
def calculate_rectangle_area(length, width):
    area = length * width
    return area

length = float(input("Enter the length of the rectangle: "))
width = float(input("Enter the width of the rectangle: "))
area = calculate_rectangle_area(length, width)
print("The area of the rectangle is:", area)
```

```
Enter the length of the rectangle: 4
Enter the width of the rectangle: 5
The area of the rectangle is: 20.0
>
```

## 2. Write a program to convert miles to kilometers

```python
def miles_to_kilometers(miles):
    kilometers = miles * 1.60934
    return kilometers

miles = float(input("Enter the distance in miles: "))
kilometers = miles_to_kilometers(miles)
print(f"{miles} miles is equal to {kilometers} kilometers.")
```

```
Enter the distance in miles: 456
456.0 miles is equal to 733.85904 kilometers.
>
```

## 3. Write a function to check if a given string is a palindrome.

```python
num=int(input("Enter a number:"))
temp=num
rev=0
while(num>0):
    dig=num%10
    rev=rev*10+dig
    num=num//10
if(temp==rev):
    print("The number is palindrome!")
else:
    print("Not a palindrome!")
```

```
Enter a number:676
The number is palindrome!
>
```

## 4. Write a Python program to find the second largest element in a list.

```python
def find_second_largest(arr):
    if len(arr) < 2:
        return "List must have at least two elements"

    largest = float('-inf')
    second_largest = float('-inf')

    for num in arr:
        if num > largest:
            second_largest = largest
            largest = num
        elif num > second_largest and num != largest:
            second_largest = num
    if second_largest == float('-inf'):
        return "There is no second largest element"
    else:
        return second_largest

arr = [int(x) for x in input("Enter elements of the list separated by space: "
    ).split()]
result = find_second_largest(arr)
print("The second largest element in the list is:", result)
```

```
Enter elements of the list separated by space: 12 45 21 34
The second largest element in the list is: 34
>
```

## 5. Explain what indentation means in Python.

**Blocks of Code**: Code blocks in Python, such as those within loops, conditional statements (like if, elif, and else), function definitions, and class definitions, are defined by indentation.

**6. Write a program to perform set difference operation.**

```
def set_difference(set1, set2):
    return set1 - set2

set1 = {1, 2, 3, 4, 5}
set2 = {3, 4, 5, 6, 7}
result = set_difference(set1, set2)
print("Set difference (set1 - set2):", result)
```

```
Set difference (set1 - set2): {1, 2}
>
```

**7. Write a Python program to print numbers from 1 to 10 using a while loop.**

```
num = 1
while num <= 10:
    print(num)
    num += 1
```

```
1
2
3
4
5
6
7
8
9
10
>
```

**8. Write a program to calculate the factorial of a number using a while loop.**

```
def factorial(n):
    if n < 0:
        return "Factorial is not defined for negative numbers"
    elif n == 0:
        return 1
    else:
        result = 1
        while n > 0:
            result *= n
            n -= 1
        return result

number = int(input("Enter a number: "))
result = factorial(number)
print("Factorial of", number, "is:", result)
```

```
Enter a number: 8
Factorial of 8 is: 40320
>
```

**9. Write a Python program to check if a number is positive, negative, or zero using if-elif-else**

Statements

```
def check_number(number):
    if number > 0:
        print("The number is positive.")
    elif number < 0:
        print("The number is negative.")
    else:
        print("The number is zero.")

number = float(input("Enter a number: "))
check_number(number)
```

```
Enter a number: 23
The number is positive.
>
```

**10. Write a program to determine the largest among three numbers using conditional** statements.

```
def find_largest(num1, num2, num3):
    if num1 >= num2 and num1 >= num3:
        return num1
    elif num2 >= num1 and num2 >= num3:
        return num2
    else:
        return num3

num1 = float(input("Enter the first number: "))
num2 = float(input("Enter the second number: "))
num3 = float(input("Enter the third number: "))
largest = find_largest(num1, num2, num3)
print("The largest number is:", largest)
```

```
Enter the first number: 12
Enter the second number: 1
Enter the third number: 24
The largest number is: 24.0
>
```

**11. Write a Python program to create a numpy array filled with ones of given shape.**

```
import numpy as np
def create_ones_array(shape):
    return np.ones(shape)
shape = tuple(map(int, input("Enter the shape of the array (separated by spaces): "
    ).split()))
ones_array = create_ones_array(shape)
print("Array filled with ones of shape", shape, "is:")
print(ones_array)
```

```
Enter the shape of the array (separated by spaces): 3 4
Array filled with ones of shape (3, 4) is:
[[1. 1. 1. 1.]
 [1. 1. 1. 1.]
 [1. 1. 1. 1.]]
>
```

**12. Write a program to create a 2D numpy array initialized with random integers**

```
import numpy as np
def create_random_array(rows, cols, low=0, high=10):
    return np.random.randint(low, high, size=(rows, cols))

rows = int(input("Enter the number of rows: "))
cols = int(input("Enter the number of columns: "))
low = int(input("Enter the lowest integer (inclusive): "))
high = int(input("Enter the highest integer (exclusive): "))

random_array = create_random_array(rows, cols, low, high)
print("2D array initialized with random integers:")
print(random_array)
```

```
Enter the number of rows: 4
Enter the number of columns: 3
Enter the lowest integer (inclusive): 2
Enter the highest integer (exclusive): 7
2D array initialized with random integers:
[[4 3 5]
 [3 2 3]
 [4 3 3]
 [5 5 2]]
>
```

**13. Write a Python program to generate an array of evenly spaced numbers over a specified** range using linspace.

```
import numpy as np
def generate_array(start, stop, num):
    return np.linspace(start, stop, num)

start = float(input("Enter the starting value of the range: "))
stop = float(input("Enter the ending value of the range: "))
num = int(input("Enter the number of samples to generate: "))

result_array = generate_array(start, stop, num)
print("Array of evenly spaced numbers over the specified range:")
print(result_array)
```

```
Enter the starting value of the range: 2
Enter the ending value of the range: 8
Enter the number of samples to generate: 4
Array of evenly spaced numbers over the specified range:
[2. 4. 6. 8.]
>
```

**14. Write a program to generate an array of 10 equally spaced values between 1 and 100 using linspace.**

```
import numpy as np
result_array = np.linspace(1, 100, 10)
print("Array of 10 equally spaced values between 1 and 100:")
print(result_array)
```

```
Array of 10 equally spaced values between 1 and 100:
[  1.  12.  23.  34.  45.  56.  67.  78.  89. 100.]
>
```

**15. Write a Python program to create an array containing even numbers from 2 to 20 using**

arange.

```
import numpy as np
result_array = np.arange(2, 21, 2)
print("Array containing even numbers from 2 to 20:")
print(result_array)
```

```
Array containing even numbers from 2 to 20:
[ 2  4  6  8 10 12 14 16 18 20]
>
```

**16. Write a program to create an array containing numbers from 1 to 10 with a step size of 0.5**

using arange.

```
import numpy as np
result_array = np.arange(1, 10.5, 0.5)
print("Array containing numbers from 1 to 10 with a step size of 0.5:")
print(result_array)
```

```
Array containing numbers from 1 to 10 with a step size of 0.5:
[ 1.   1.5  2.   2.5  3.   3.5  4.   4.5  5.   5.5  6.   6.5  7.   7.5
  8.   8.5  9.   9.5 10. ]
>
```