(Q1) Write a Python program to calculate the area of a rectangle given its length and width?

```
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)
```

(Q2) Write a program to convert miles to kilometers?

```
miles = float(input("Enter the distance in miles: "))

kilometers = miles_to_kilometers(miles)

print(f"{miles} miles is equal to {kilometers} kilometers")
```

(Q3) Write a function to check if a given string is a palindrome?

```
def isPalindrome(str):
   if (str == str[::-1]) :
      return "The string is a palindrome."
   else:
      return "The string is not a palindrome."
 str = input ("Enter string: ")
 print(isPalindrome(str))
```

(Q4) Write a Python program to find the second largest element in a list?

```
first = second = float('-inf')

if num > first:
        second = first
        first = num
    elif num > second and num != first:
        second = num

   return second

i = input("Enter elements of the list separated by spaces: ")

li= list(map(int, i.split()))

sort = sorted(set(li))

if len(sort) >= 2:

   print("Second largest element is:", sort[-2])

else:

   print("No second largest element found.")
```

(Q5) Explain what indentation means in Python?

1. Indentation can be achieved by four spaces or tab space in workspace
2. It helps Python determine the structure of the code
3. It helps Python determine the scope of various constructs like loops, conditionals, and function definitions.

Effects:

- Incorrect indentation can lead to
    1. syntax errors
    2. change the logical structure of the code
    3. potentially leading to unintended behaviour.

Example:

```
If(age>=18):
    Print("Eligible to vote")
else:
    Print("Not Eligible to vote")
```

(The print statement outside the if block is not indented, indicating that it is not part of the if block.)

(Q6) Write a program to perform set difference operation?

```
def user_input():
    i= input("Enter elements of the set separated by spaces: ")
    return set(map(int, i.split()))
set1 = user_input()
set2 = user_input()
print("Union:", set1 | set2 )
print("Intersection:", set1 & set2)
print("Difference:", set1 - set2)
print("Symmetric Difference:", set1 ^ set2)
print("Is Subset:", set1 <= set2)
print("Is Superset:", set1 >= set2)
print("Are Disjoint:", set1.isdisjoint(set2))
```

(Q7) Write a Python program to print numbers from 1 to 10 using a while loop?

```
n= 1

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

(Q8) Write a program to calculate the factorial of a number using a while loop?

```
i = int(input("Enter a non-negative integer: "))
if i < 0:
    print("Factorial is not defined for negative numbers.")
elif i == 0 or i == 1:
    print("The factorial of", i, "is: 1")
else
    result = 1
    n = i
    while n > 1:
        result *= n
        n -= 1
    print(f"The factorial of {i} is: {result}")
```

(Q9) Write a Python program to check if a number is positive, negative, or zero using if-elif-else statements?

```
number = float(input("Enter a
number: "))if n> 0:
    print("The number is positive.")
elif n < 0:
    print("The number is negative.")
else:
    print("The number is zero.")
```

(Q10) Write a program to determine the largest among three numbers using conditional Statements?

```
num1 = float(input("Enter first number: "))
num2 = float(input("Enter second number: "))
num3 = float(input("Enter third number: "))

l = n1
if n2 > l:
    l = num2
```

```
if n3 > l:
   l = num3
print("Largest number is:", l)
```

(Q11) Write a Python program to create a numpy array filled with ones of given shape?

```
import numpy as np
print(np.ones(int(input(" "))))
```

(or)

```
import numpy as np
i = input("Enter the shape of the array separated by spaces : ")
print(np.ones(tuple(map(int, i.split()))))

#i- input by user is "3 4".
#split()- returns a list of substrings. it returns ["3", "4"].
#map()-converts each string in the list to an integer. It becomes [3, 4].
#tuple()-converts the map object returned by map() into a tuple.(3,4).
```

(Q12) Write a program to create a 2D numpy array initialized with random integers?

```
import numpy as np
rows = int(input("Enter the number of rows: "))
cols = int(input("Enter the number of columns: "))

random_array = np.random.randint(low=0,
high=100, size=(rows, cols))

start = int(input("Enter the begin value of range: "))
stop = int(input("Enter the last value of range: "))
print(np.random.randint(strat,stop,(rows, cols)))
print("2D Numpy Array Initialized with Random Integers:")
print(random_array)
```

(Q13) Write a Python program to generate an array of evenly spaced numbers over a specified range using linspace?

Syntax: np.linspace(start,end,number of elements)-evenly spaced step size

```
import numpy as np
start = int(input("Enter the start of the range: "))
```

```
end = int(input("Enter the end of the range: "))
num= int(input("Enter the number of points: "))
print(np.linspace(start, end, num))
```

(Q14) Write a program to generate an array of 10 equally spaced values between 1 and 100 using Linspace?

```
import numpy as np
print("Array of 10 Equally Spaced Values between 1 and 100:")
print(equally_spaced_array)
```

(Q15) Write a Python program to create an array containing even numbers from 2 to 20 using Arange?

Syntax: np.arange(stat,end,stepsize)-number of elements will depend on stepsize and end value

Note: end value should be exceed up on one by our required value

```
import numpy as np
print(np.arange(2, 21, 2))
```

(Q16) 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
array_with_step =
np.arange(1, 10.5,
0.5)
print(np.arange(1, 11, 0.5))
```