1. 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 = length * width
print(f"The area of the rectangle is: {area}")
```

```
Enter the length of the rectangle: 4
Enter the width of the rectangle: 3
The area of the rectangle is: 12.0
```

2. Write a program to convert miles to kilometers

```
miles = float(input("Enter distance in miles: "))
kilometers = miles * 1.60934
print(f"{miles} miles is equal to {kilometers} kilometers")
```

```
Enter distance in miles: 120
120.0 miles is equal to 193.1208 kilometers
```

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

```
def is_palindrome(s):
    return s == s[::-1]

input_str = input("Enter a string: ")
if is_palindrome(input_str):
    print("It is a palindrome.")
else:
    print("It is not a palindrome.")
```

```
Enter a string: abcba
It is a palindrome.
```

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

```
numbers = [int(x) for x in input("Enter numbers separated by space: ").split()]
sorted_numbers = sorted(set(numbers), reverse=True)
second_largest = sorted_numbers[1] if len(sorted_numbers) > 1 else None
print(f"The second largest element is: {second_largest}")
```

```
Enter numbers separated by space: 12 23 31 43
The second largest element is: 31
```

5. Explain what indentation means in Python.

Python uses indentation to define blocks of code (e.g., within loops, functions, or conditional statements). It is crucial for readability and structure. Indentation is typically done with spaces or tabs, but it must be consistent within the same block.

6. Write a program to perform set difference operation.

```
set1 = {1, 2, 3, 4, 5}
set2 = {3, 4, 5, 6, 7}
difference = set1 - set2
print(f"The set difference is: {difference}")
```

```
The set difference is: {1, 2}
```

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

```
i = 1
while i <= 10:
    print(i, end=" ")
    i += 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.

```
n = int(input("Enter a number: "))
factorial = 1
while n > 1:
    factorial *= n
    n -= 1
print(f"The factorial is: {factorial}")
```

```
Enter a number: 5
The factorial is: 120
```

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

```
num = float(input("Enter a number: "))
if num > 0:
    print("Positive number")
elif num < 0:
    print("Negative number")
else:
    print("Zero")
```

```
Enter a number: 33
Positive number
```

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

```
a, b, c = map(float, input("Enter three numbers separated by space: ").split())
largest = max(a, b, c)
print(f"The largest number is: {largest}")
```

```
Enter three numbers separated by space: 32 21 54
The largest number is: 54.0
```

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

```
import numpy as np
shape = tuple(map(int, input("Enter the shape of the array (space-separated): ").sp
ones_array = np.ones(shape)
print("Array of ones:")
print(ones_array)
```

```
Enter the shape of the array (space-separated): 3
Array of ones:
[1. 1. 1.]
```

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

```
import numpy as np
rows, cols = map(int, input("Enter the number of rows and columns (space-separated): ").spli
random_array = np.random.randint(1, 100, size=(rows, cols))
print("2D Array with random integers:")
print(random_array)
```

```
Enter the number of rows and columns (space-separated): 3 3
2D Array with random integers:
[[98 27 87]
 [58 15 46]
 [22 56 21]]
```

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

```
import numpy as np
start, stop, num = map(int, input("Enter start, stop, and number of elements (space-separate
linspace_array = np.linspace(start, stop, num)
print("Array using linspace:")
print(linspace_array)
```

```
Enter start, stop, and number of elements (space-separated): 1 30 10
Array using linspace:
[ 1.          4.22222222  7.44444444 10.66666667 13.88888889 17.11111111
 20.33333333 23.55555556 26.77777778 30.        ]
```

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

```
import numpy as np
linspace_array = np.linspace(1, 100, 10)
print("Array of 10 equally spaced values between 1 and 100:")
print(linspace_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
even_array = np.arange(2, 21, 2)
print("Array of even numbers from 2 to 20:")
print(even_array)
```

```
Array of 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
array_with_step = np.arange(1, 10.5, 0.5)
print("Array from 1 to 10 with a step size of 0.5:")
print(array_with_step)
```

```
Array 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. ]
```

```
Start coding or generate with AI.
```