**Python programming**

**Block 1**

1. Describe the Python programming language, its features and disadvantages. Describe the installation process for Python or the Anaconda framework.
2. Describe the creation of variables and the definition of their data types.
3. List and provide examples of the use of arithmetic, logical and comparison operators.
4. Describe the process of creating conditional and loop statements. Give examples.
5. Describe the use of reserved words. Give examples of their use in the program.
6. Describe the process of data input / output in the program. Give examples.
7. Show how comments are created in Python. Please provide some example code with comments.
8. Describe the meaning of indentation in Python. Please provide example code with different indents.
9. Describe the creation of functions. Give examples of functions that return and do not return values.
10. Describe how to work with strings in Python. Give an example of strings and string concatenation operation.
11. Describe working with strings in Python. Give an example of getting the character of a string by index.
12. Describe the use of loops when iterating over lines. Give examples.
13. Describe the use of functions for working with strings. Write examples of functions that convert strings to upper and lower case and remove spaces.
14. Describe the use of functions for working with strings. Give examples of functions that search for a substring in a string.
15. Describe the use of functions for working with strings. Give an example of a function that searches and replaces a substring.

**Block 2**

1. Describe working with files in Python. Describe opening files in binary and text mode.
2. Describe working with files in Python. Give examples of creating files for reading and writing data.
3. Describe working with collections in Python. Give examples.
4. Describe working with lists in Python. Give examples of looping through a list.
5. Describe working with lists in Python. Give an example of using the list functions.
6. Describe working with lists in Python. Give examples of sorting lists and slicing operations.
7. Describe working with dictionaries in Python. Give examples of dictionary iterations.
8. Describe working with tuples in Python. Give examples of creating a list of tuples.
9. Describe how regular expressions work in Python. Give an example of using regular expression matching and extracting functions.
10. Describe working with classes in Python. Give examples of creating classes and objects.
11. Describe working with the Numpy library. Give examples of Numpy creation of arrays and matrices, as well as the operations of addition and multiplication of arrays and matrices.
12. Describe working with the Numpy library. Give an example of executing the dot product of vectors using the dot function.
13. Describe working with the Pandas library. Give examples of creating a Dataframe, as well as grouping data in a Dataframe.
14. Describe working with the Pandas library. Give examples of data selection by rows and columns, as well as data filtering.
15. Describe working with the Matplotlib library. Give examples of functions for drawing graphics using the plot function.

**Block 3**

1. Write a program that iterates the first 100 numbers (from 0 to 100), and at each iteration print the sum of the current number and the previous number.
2. Write a program that iterates the first 50 numbers (from 0 to 50), and at each iteration print the product of the current number and the previous number.
3. Write a program that iterates the first 80 numbers (from 0 to 80), and at each iteration print the difference between the current number and the previous number.
4. Write a program that displays only those characters present in an even number of the line index. Create your own string.
5. Write a program that displays only those characters present in the odd number of the line index. Create your own string.
6. Write a program that iterates over a list and outputs only numbers that are divisible by 5. Create your list.
7. Write a program that iterates over a list and outputs only numbers that are divisible by 10. Create your list.
8. Write a program that sorts the list and displays its last 10 items. Build your list.
9. Write a program that adds numbers from two lists. Create your own lists. If the lists differ in length, then make them equal by removing the extra numbers.
10. Write a program that multiplies the numbers in two lists. Create your own lists. If the lists differ in length, then make them equal by removing the extra numbers.
11. Write a program to display all prime numbers in a range. A prime number is an integer that cannot be obtained by multiplying other integers.
12. Write the calculation () function so that it can take two variables and calculate their addition and subtraction. It should also return both addition and subtraction in a single return call.
13. Write a program that, given two strings s1 and s2, can return a newline consisting of the first, middle, and last characters of each input string.
14. Write a program that dashes a given string into multiple substrings and displays each substring. str = “Emma-is-a-data-scientist”.
15. Write a program that finds the value 20 in the given Python list and, if there is one, replaces it with 200. Update only the first occurrence of the value. Give your list of numbers 20.
16. Write a program that renames the key value "city" to "location" in the following dictionary.

sampleDict = {

“name”: “Kelly”,

“age”: 25,

“salary”: 8000,

“city”: “New York”

}

1. Write a program that returns all elements from two sets that are not present in both of them.

set1 = {10,20,30,40,50}

set2 = {30,40,50,60,70}

1. Write a program that updates set1 by adding elements from set2 and also removes their common elements.

set1 = {10,20,30,40,50}

set2 = {30,40,50,60,70}

1. Write a program that adds the following two NumPy arrays. Then change the array of results by squaring each element.

arrayOne = numpy.array([[5,6,9], [21,18,27]])

arrayTwo = numpy.array([[15,33,24], [4,7,1]])

1. Write a program that subtracts the following two NumPy arrays. Then change the array of results by squaring each element.

arrayOne = numpy.array([[5,6,9], [21,18,27]])

arrayTwo = numpy.array([[15,33,24], [4,7,1]])

1. Write a program that performs the multiplication of the following two NumPy arrays.

arrayOne = numpy.array([[5,6,9], [21,18,27]])

arrayTwo = numpy.array([[15,33,24], [4,7,1]])

1. Write a program that creates a dataframe from a dictionary.

{'X':[78,85,96,80,86], 'Y':[84,94,89,83,86],'Z':[86,97,96,72,83]}

1. Write a program that removes lines (2 and 4) from the dataframe

Original DataFrame  
col1 col2 col3  
0 1 4 7  
1 4 5 8  
2 3 6 9  
3 4 7 0  
4 5 8 1

1. Write a program that removes lines (1, 2 and 4) from the dataframe

Original DataFrame  
col1 col2 col3  
0 1 4 7  
1 4 5 8  
2 3 6 9  
3 4 7 0  
4 5 8 1

1. Write a program that removes columns col1 and col3 from a data frame

Original DataFrame  
col1 col2 col3  
0 1 4 7  
1 4 5 8  
2 3 6 9  
3 4 7 0  
4 5 8 1

1. Write a program that displays lines from a dataframe where col1 values are greater than 5.

Original DataFrame  
col1 col2 col3  
0 1 4 7  
1 4 5 8  
2 3 6 9  
3 4 7 0  
4 5 8 1

1. Write a program that outputs lines from a dataframe in which col2 values are greater than 1 and less than 5.

Original DataFrame  
col1 col2 col3  
0 1 4 7  
1 4 5 8  
2 3 6 9  
3 4 7 0  
4 5 8 1

1. Write a program that connects two dataframes on the 'key' column

left = pd.DataFrame({'key': ['K0', 'K1', 'K2', 'K4'],

'A': ['A0', 'A1', 'A2', 'A3'],

'B': ['B0', 'B1', 'B2', 'B3']})

right = pd.DataFrame({'key': ['K0', 'K1', 'K2', 'K3'],

'C': ['C0', 'C1', 'C2', 'C3'],

'D': ['D0', 'D1', 'D2', 'D3']})

1. Write a program that groups the dataset by company and finds the averages for ‘Sales’ and ‘Salary’.

data = {

'Company': ['GOOG','GOOG','MSTF','MSTF','FB','FB'],

'Person': ['Sam','Charlie','Amy','Vanessa','Carl','Sarah'],

'Sales': [200,120,340,124,243,350],

'Salary':[20000,15000,20022,9567,12313,40000]

}

1. Write a program that groups the dataset by company and finds the maximum values for ‘Sales’ and ‘Salary’.

data = {

'Company': ['GOOG','GOOG','MSTF','MSTF','FB','FB'],

'Person': ['Sam','Charlie','Amy','Vanessa','Carl','Sarah'],

'Sales': [200,120,340,124,243,350],

'Salary':[20000,15000,20022,9567,12313,40000]

}