Answer all Questions.

1. (ELEMENT-WISE ARRAY MULTIPLICATION) Create a 3-by-3 array containing the even integers from 2 through 18. Create a second 3-by-3 array containing the integers from 9 down to 1, then multiply the first array by the second.

2. (ARRAY FROM LIST OF LISTS) Create a 2-by-5 array from an argument which is a list of the two five-element lists [2, 3, 5, 7, 11] and [13, 17, 19, 23, 29].

3. (FLATTENING ARRAYS WITH FLATTEN VS. RAVEL) Create a 2-by-3 array containing the first six powers of 2 beginning with 20. Flatten the array first with method flatten, then with ravel. In each case, display the result then display the original array to show that it was unmodified.

4. (INDEXING AND SLICING ARRAYS) Create an array containing the values 1–15, reshape it into a 3-by-5 array, then use indexing and slicing techniques to perform each of the following operations:

a. Select row 2.
b. Select column 5.
c. Select rows 0 and 1.
d. Select columns 2–4.
e. Select the element that is in row 1 and column 4.
f. Select all elements from rows 1 and 2 that are in columns 0, 2 and 4.

5. (HORIZONTAL AND VERTICAL STACKING) Create the two-dimensional arrays

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array1 = np.array([[0, 1], [2, 3]])
array2 = np.array([[4, 5], [6, 7]])
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a. Use vertical stacking to create the 4-by-2 array named array3 with array1 stacked on top of array2.
b. Use horizontal stacking to create the 2-by-4 array named array4 with array2 to the right of array1.
c. Use vertical stacking with two copies of array4 to create a 4-by-4 array5.
d. Use horizontal stacking with two copies of array3 to create a 4-by-4 array6.

6. (PANDAS: SERIES) Perform the following tasks with pandas Series:

a. Create a Series from the list [7, 11, 13, 17].

b. Create a Series with five elements that are all 100.0.

c. Create a Series with 20 elements that are all random numbers in the range 0 to 100. Use method describe to produce the Series' basic descriptive statistics.

d. Create a Series called temperatures of the floating-point values 98.6, 98.9, 100.2 and 97.9. Using the index keyword argument, specify the custom indices 'Julie', 'Charlie', 'Sam' and 'Andrea'.

e. Form a dictionary from the names and values in Part (d), then use it to initialize a Series.

7. (PANDAS: DATAFRAMES) Perform the following tasks with pandas DataFrames:

a. Create a DataFrame named temperatures from a dictionary of three temperature readings each for 'Maxine', 'James' and 'Amanda'.

b. Recreate the DataFrame temperatures in Part (a) with custom indices using the index keyword argument and a list containing 'Morning', 'Afternoon' and 'Evening'.

c. Select from temperatures the column of temperature readings for 'Maxine'.

d. Select from temperatures the row of 'Morning' temperature readings.

e. Select from temperatures the rows for 'Morning' and 'Evening' temperature readings.

f. Select from temperatures the columns of temperature readings for 'Amanda' and 'Maxine'.

g. Select from temperatures the elements for 'Amanda' and 'Maxine' in the 'Morning' and 'Afternoon'.

h. Use the describe method to produce temperatures' descriptive statistics.

i. Transpose temperatures.

j. Sort temperatures so that its column names are in alphabetical order.