

- 1 The head of the mathematics department would like to combine and rank the examination results from 3 classes so that a summary report can be generated. The mathematics teachers from these classes were instructed to use the following format (on each line of a text file) when collating the results:

<student index number>,<student examination score>

After the results from each class had been collated, the following was discovered. Each <student index number> was stored as a denary value. However, the mathematics teachers stored <student examination score> values using different base number systems.

The following were the base number systems utilised:

- Class 2A: binary
- Class 2B: octal
- Class 2C: hexadecimal

It should be noted that all index numbers and examination scores correspond to non-negative integer values.

Task 1.1

Write the program code for the function `base_n_to_denary(value_str, n)`, which converts the given base `n`, non-negative integer value, `value_str`, into its corresponding denary value, and then returns it.

More specifically, this function should take the following arguments.

- `value_str`: a string corresponding to a base `n` value.
- `n`: a positive integer between 2 and 16 corresponding to the base number system used to represent `value_str`.

The function should then return an integer (i.e., a denary value), whose value is equal to `value_str`. You may not use any inbuilt functionality to perform this conversion.

Evidence 1

- The program code for the function `base_n_to_denary(value_str, n)`. [3]

As mentioned above, the head of the mathematics department would like to generate a summary report of the examination.

The format of this summary report is as follows:

Mathematics results for classes 2A, 2B and 2C:

The highest examination score: 100.0
 The average examination score: 50.0
 The lowest examination score: 0.0

The top 3 students are:

Class	Index	Mark
2A	1	100
2C	10	98
2B	3	96

Note that the values used in the example summary report above are not based on the actual values that are found in the given files.

Task 1.2

Write the program code to perform the following.

- Read and store the contents of the files:
 - 2A_SCORES.TXT
 - 2B_SCORES.TXT
 - 2C_SCORES.TXT
- When storing this data, utilise the function `base_n_to_denary(value_str, n)` to convert the scores in each file to their corresponding denary values.

Evidence 2

- The program code to perform the above task.

[3]

Task 1.3

Write the program code for the function `sort_student_scores(...)`, which uses the class, index and score data (i.e., the data retrieved from the 3 files listed in **Task 1.2**), and returns the same information, but sorted in **descending order** based on score.

When considering the parameters and return value for `sort_student_scores(...)`, your decision(s) should be based upon the usage of this information to produce the summary report described earlier in this question.

Note that you are to utilise the **quicksort** algorithm to perform the required sorting. Also note that you may not utilise any inbuilt functionality to search or sort when writing this function.

Evidence 3

- The program code for the function `sort_student_scores(...)`.

[5]

Task 1.4

Utilise the data from **Task 1.2**, and the function implemented in **Task 1.3** – i.e., `sort_student_scores(...)`, to produce the summary report described earlier in this question.

Note that you may not use any inbuilt functionality to find the:

- Average score
- Maximum score
- Minimum score

Evidence 4

- The program code to print the summary report.

[3]

Evidence 5

- A screenshot of the summary report output.

[1]