

Day 4 Exercises

Section F. Examples involving String Handling

3. Modify program 2 to accommodate sentences which may have upper case letters, punctuation or space that may need to be ignored while doing the test.
 - Examples:
A Santa at NASA
Mr. Owl ate my metal worm
4. The C# language gives facilities for changing cases all to upper or lower - however, not to title case. Write a program that would convert a given sentence/phrase to title case.
Example
“institute of systems science” => “Institute Of System Science”
5. The marks obtained by five students in Programming course are as below:

Name	Mark
John	63
Venkat	29
Mary	75
Victor	82
Betty	55

Write a program that would take store the above information in two arrays (one for Name and one for Marks. The program would then print two reports:

- a. First report sorted in descending order of the Marks (i.e. student rank)
 - b. Second report sorted on student names alphabetically.
6. In Neverland University, each student is identified by their matriculation number. The format of matriculation number is A00000X (alphabet A followed with 5 digits and another alphabets). The last alphabet is called as the checksum.

The checksum can be used to validate the matriculation number. The calculation to determine the checksum is as follow:

Steps	Example (A56742)	Result
Take the first number digit and multiply with 6	5 * 6	30
Take the second digit and multiply with 5	6 * 5	30
Take the third digit and multiply with 4	7 * 4	28
Take the fourth digit and multiply with 3	4 * 3	12
Take the fifth digit and multiply with 2	2 * 2	4

Calculate the sum	$30 + 30 + 28 + 12 + 4$	104												
Divide by 5 and take the remainder	$104 \% 5$	4												
Obtain the checksum based on the remainder value:	4 mapped to “S”	“S”												
<table><tr><td>Remainder</td><td>Checksum</td></tr><tr><td>0</td><td>O</td></tr><tr><td>1</td><td>P</td></tr><tr><td>2</td><td>Q</td></tr><tr><td>3</td><td>R</td></tr><tr><td>4</td><td>S</td></tr></table>	Remainder	Checksum	0	O	1	P	2	Q	3	R	4	S		
Remainder	Checksum													
0	O													
1	P													
2	Q													
3	R													
4	S													

Based on the above example, A56742S is a valid matriculation number, while A56742O is not.

Write a program that will ask the user to enter a matriculation number and returns whether the matriculation number is valid or not. Specifically the program should do the following:

- Check that the length of the input is exactly 7 characters, otherwise it's invalid
- Convert the entire string to uppercase so that we don't have to worry about case
- Calculate the checksum based on the rule.
- Check whether the last character matches the calculated checksum.

Sample outputs:

```
Enter a matriculation number: A56742A
Invalid
```

```
Enter a matriculation number: A56742S
Valid
```

Section G. Examples that require the use of Arrays

1. A company records its monthly sales information in an array of size 12; where Sales[0] represents January sales, Sales[1] is February sales etc. After entering the data the company wants to perform some queries on the data. Write a program that would do the following:
 - a. Take in the sales for the 12 months.
Note: You may use the array initialisation inside the program for storing these.
 - b. Print the month when Maximum Sales is recorded.
Note: You may just print 0, 1 etc. for Jan Feb etc...
 - c. Print the month where Minimum Sales is recorded.
 - d. Print the average monthly sales for the year.
2. Write a C# program that would sort a numeric array in descending order using the simplified selection sort method described.

At the end of each pass print out the array to know the progress!

Example for Multidimensional Array

3. The marks of students are stored in a two dimensional array with the subjects represented in columns and the students in the rows. That is Row 1 would pertain to Student 1 and the scores that this student has obtained is stored in various columns in row 1. Assuming that there are 12 students in a class and 4 subjects, write a program that would do the following:
 - a. Compute the total marks obtained each student.
 - b. Compute the class average (and standard deviation* - optional) of Marks for each subject.
 - c. Determine the overall average of marks for the whole class for each subjects.
 - d. Optional – make sure that your code works regardless of the number of students and the number of subjects. This means that you cannot make any assumption in the code that there are 12 students and 4 subjects.

Note:

- * calculation of standard deviation is not required for first time exercise you may only compute the average – those needing additional practice may compute standard deviation)

Standard Deviation is square root of variance where Variance is given by:

$$\text{VARIANCE} = \{ [\text{SUM OF } (X_i - M)^2] / N \}; \quad i = 1 \text{ to } N$$

N is number of data elements (X_i) and

M is mean (average).

Subject 1	Subject 2	Subject 3	Subject 4	Total	Avg
56	84	68	29	237	59.25
94	73	31	96	294	73.5
41	63	36	90	230	57.5
99	9	18	17	143	35.75
62	3	65	75	205	51.25
40	96	53	23	212	53
81	15	27	30	153	38.25
21	70	100	22	213	53.25
88	50	13	12	163	40.75
48	54	52	78	232	58
64	71	67	25	227	56.75
16	93	46	72	227	56.75

Average per subject:

59.16667	56.75	48	47.41667
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