NATIONAL UNIVERSITY
OF COMPUTER AND EMERGING SCIENCES

Course: Programming Fundamentals

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Due Date: October 14, 2019 05:00 PM

Instructions:

- This assignment is to be submitted in hard form to the TA's.
- Plagiarism will result in **zero** credit in the assignment.

Task 1:

Write a program that takes integer between 0 to 100 and calculates the grade according to the FAST NUCES standard. This standard is described bellow.

Marks 90 and above is A+, marks between 89 and 86 is A, marks between 85 and 82 is A-, marks between 81 and 78 is B+, marks between 77 and 74 is B, marks between 73 and 70 is B-, marks between 69 and 66 is C+, marks between 65 and 62 is C, marks between 61 and 58 is C-, marks between 57 and 54 is D+, marks between 53 and 50 is D, marks bellow 50 is F.

Task 2:

Write a program that takes input grades of 3 courses and calculates the Semester GPA (SGPA) of the student.

$$\text{SGPA} = \frac{course\,1\ points + course\,2\ points + course\,3\ points}{number\ of\ courses}$$

Point equivalent to A+ is 4.00, A is 4.00, A- is 3.67, B+ is 3.33, B is 3.00, B- is 2.67, C+ is 2.33, C is 2.00, C- is 1.67, D+ is 1.33, D is 1.00 and F is 0.00.

The SGPA of “A”, “A”, “D” should be 3.0.

This program should also be able to calculate the SGPA of less then 3 courses. This will be done by giving the value “nothing” instead of the grade. eg. input “A”, “B”, “nothing” should result in SPGA = 3.5.

Task 3:

Write a program to calculate the electricity bill of a customer. Program will take input the units consumed by the customer. The rate is as follows.

First 50 units will be charged at $1.20/unit.
Next 100 units will be charged at $1.50/unit.
Next 100 units will be charged at $1.80/unit.
More than 250 will be charged at $2.00/unit.

Task 4:

The roots of the quadratic equation $ax^2+bx+c=0$, $a\neq 0$ are given by the following formula:

$$\frac{-b^2\pm\sqrt{b^2-4ac}}{2a}$$

In this formula, the term b^2-4ac is called the discriminant. If $b^2-4ac=0$, then the equation has a single root. If , $b^2-4ac>0$ the equation has two real roots. If $b^2-4ac<0$, the equation has two complex roots. Write a program that prompts the user to input the value of a (the coefficient of x^2), b (the coefficient of x), and c (the constant term) and outputs the type of roots of the equation. Furthermore, if $b^2-4ac\geq 0$, the program should output the roots of the quadratic equation.

(Hint: Use the function **pow** from the **cmath** library to calculate the square root).

Task 5:

A box of cookies can hold 24 cookies, and a container can hold 75 boxes of cookies. Write a program that prompts the user to enter the total number of cookies, the number of cookies in a box, and the number of cookie boxes in a container. The program then outputs the number of boxes and the number of containers to ship the cookies. Note that each box must contain the specified number of cookies, and each container must contain the specified number of boxes. If the last box of cookies contains less than the number of specified cookies, you can discard it and output the number of leftover cookies. Similarly, if the last container contains less than the number of specified boxes, you can discard it and output the number of leftover boxes.