Universidad Centroamericana “José Simeón Cañas”
Facultad de Ingeniería y Arquitectura

Tutorías - Fundamentos de Programación Ciclo 01/2021
Tutor: Ernesto José Canales Guillén

Estructuras de Control en C++

Ejercicios propuestos para el uso de SWITCH

1. If the number of items bought is less than 5, then the shipping charges are $5.00 for each item bought; if the number of items bought is at least 5, but less than 10, then the shipping charges are $2.00 for each item bought; if the number of items bought is at least 10, there are no shipping charges.

2. Suppose that classStanding is a char variable, and gpa and dues are double variables. Write a switch expression that assigns the dues as following: (Note that the code 'f' stands for first year students, the code 's' stands for second year students, the code 'j' stands for juniors, and the code 'n' stands for seniors.)
    a. If classStanding is 'f', the dues are $150.00;
    b. if classStanding is 's' (if gpa is at least 3.75, the dues are $75.00; otherwise, dues are 120.00);
    c. if classStanding is 'j' (if gpa is at least 3.75, the dues are $50.00; otherwise, dues are $100.00);
    d. if classStanding is 'n' (if gpa is at least 3.75, the dues are $25.00; otherwise, dues are $75.00).

3. One way to determine how healthy a person is by measuring the body fat of the person. The formulas to determine the body fat for female and male are as follows: (Write a program to calculate the body fat of a person.)
    a. Body fat formula for women:
        i. A1 = (body weight * 0.732) + 8.987
        ii. A2 = wrist measurement (at fullest point) / 3.140
        iii. A3 = waist measurement (at navel) * 0.157
        iv. A4 = hip measurement (at fullest point) * 0.249
        v. A5 = forearm measurement (at fullest point) * 0.434
        vi. B = A1 + A2 – A3 – A4 + A5
        vii. Body fat = body weight – B
        viii. Body fat percentage = body fat * 100 / body weight
    b. Body fat formula for men:
        i. A1 = (body weight * 1.082) + 94.42
        ii. A2 = wrist measurement * 4.15
        iii. B = A1 – A2
        iv. Body fat = body weight – B
        v. Body fat percentage = body fat * 100 / body weight

4. A new author is in the process of negotiating a contract for a new romance novel. The publisher is offering three options.
    a. In the first option, the author is paid $5,000 upon delivery of the final manuscript and $20,000 when the novel is published.
    b. In the second option, the author is paid 12.5% of the net price of the novel for each copy of the novel sold.
    c. In the third option, the author is paid 10% of the net price for the first 4000 copies sold, and 14% of the net price for the copies sold over 4000.

- The author has some idea about the number of copies that will be sold and would like to have an estimate of the royalties generated under each option.
- Write a program that prompts the author to enter the net price of each copy of the novel and the estimated number of copies that will be sold.
- The program then outputs the royalties under each option and the best option the author could choose. (Use appropriate named constants to store the special values such as royalties rates and fixed royalties.)

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

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

- In this formula, the term $b^2 - 4ac$ is called the discriminant.
- If $b^2 - 4ac = 0$, then the equation has a single (repeated) root.
- If $b^2 - 4ac > 0$, the equation has two real roots.
- If $b^2 - 4ac < 0$, the equation has two complex roots.

   a. 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.

   b. Furthermore, if $b^2 - 4ac \geq 0$ the program should output the roots of the quadratic equation.

Ejercicios extraídos de: C++ Programming: From Problem Analysis to Program Design.