Introduction to Programming

Lab 02
Control Statements - Functions

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Content

In this lab, we will practice the following topics:

- Write basic statements
- Use built-in functions
- Apply conditional statements
- Apply loop statements
- Write functions
- Divide the source code into multiple files

2 Assignments

A: YY: 01

H: YY: 10

W02: Assignments in odd positions, such as 1, 3, 5, 7…19

W03: Assignments in even positions, such as 2, 4, 5, 6…20

Besides the main() function, students are asked to write at least one more function in the following assignments. The source code should be located in 3 different files (or more).

- A header file which containing all declarations.
- A source file which containing all function definitions.
- Another source file which containing the main() function.

2.1 Assignment – Triangle

Write a program that takes the lengths of the three sides of a valid triangle as input. The program should calculate and print the perimeter and area of the triangle.

2.2 Assignment – Student Classification

Write a program that takes the average score (GPA) of a student as input and determines the classification of that student.

9 – 10: Outstanding

8 – 9: Excellent

7 – 8: Good

6 – 7: Above Average

5 – 6: Average

Below 5: Below Average

2.3 Assignment – ax + b = 0

Write a program that takes two real numbers, a and b, as input. Solve the equation: $ax + b = 0$

2.4 Assignment ax^2 + bx + c = 0

Write a program that takes three real numbers, a, b, and c, as input. Solve the equation: $ax^2 + bx + c = 0$

2.5 Assignment – Tomorrow

Write a program that takes 3 valid values of day, month and year. Find the date after the given date.

2.6 Assignment – Yesterday

Write a program that takes 3 valid values of day, month and year. Find the date before the given date.

2.7 Assignment – Round of integer

Write a program that takes two positive integers, x and x, as input. Round x to the nearest multiple of 10^y

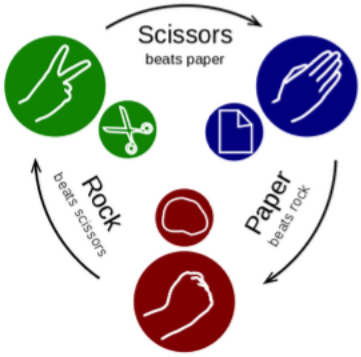
Input: 12345678 3

Output: 12346000

2.8 Assignment – Rock, Scissors, Paper

Input: R, S, P, r, s, or p.

Output: Player 1 wins; Player 2 wins; Draw



2.9 Assignment – S(x, n)

Write a program that takes a real number x and a non-negative integer n. Calculate:

$$S(x,n) = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \cdots + \frac{x^{2n}}{(2n)!}$$

2.10 Assignment – Prime number

Write a program that takes an integer n. Check whether n is a prime number or not.

2.11 Assignment – Reversed number

Write a program that takes an non-negative integer n. Find the reversed value of n.

Input: 123456

Output: 654321

Input: 600

Output: 6

2.12 Assignment – Largest digit of n

Write a program that takes an non-negative integer n. Find the largest digit of n.

Input: 1238456

Output: 8

2.13 Assignment – Number of appearances of the largest digit

Write a program that takes an non-negative integer n. Find the number of appearances of the largest digit in n.

Input: 1838456

Output: 2

2.14 Assignment – All Odd Digits

Write a program that takes an non-negative integer n. Check whether all digits of n are odd numbers or not.

Input: 759155

Output: YES

Input: 25837283

Output: NO

Input: 2468

Output: NO

2.15 Assignment – Digits are increasing

Check whether the digits of a given positive integer n are in non-decreasing order from left to right.

Input: 1223579

Output: YES

Input: 1225379

Output: NO

2.16 Assignment – Greatest Common Divisor

Find the greatest common divisor of 2 positive integers, a and b.

2.17 Assignment – S(x, n)

Write a program that takes a real number x and a non-negative integer n. Calculate:

$$S(x,n) = x - x^2 + x^3 - x^4 + \cdots + (-1)^{n+1}x^n$$

2.18 Assignment – S(x, n)

Write a program that takes a real number x and a non-negative integer n. Calculate:

$$S(x,n) = -x + \frac{x^2}{1+2} - \frac{x^3}{1+2+3} + \cdots + (-1)^n \frac{x^n}{1+2+\cdots+n}$$

2.19 Assignment – Buffalo

BÀI 1 Bài toán cổ *Trăm trâu, trăm cỏ. Trâu đứng ăn năm. Trâu nằm ăn ba. Lụ khụ trâu già. Ba con một bó. Mỗi loại mấy trâu?* là bài toán có nhiều nghiệm.

Ví dụ, nghiệm thứ nhất, số trâu đứng: 0, số trâu nằm: 25, số trâu già: 75; nghiệm thứ hai, số trâu đứng: 4, số trâu nằm: 18, số trâu già: 78;...

(15 điểm) Hãy viết chương trình in ra màn hình TẤT CẢ các nghiệm có thể có (số trâu nằm, số trâu đứng, số trâu già) của bài toán cổ trên.

2.20 Assignment – Second Largest Value

```
void printSecondLargest(int a, int b, int c);
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a = 5, b = 3, c = 4 => Second largest: 4

a = 5, b = 5, c = 4 => Second largest: 4

a = 5, b = 5, c = 5 => No second largest