Subject: PRO192 - LAB 01

Mỗi Program tạo 1 project riêng có tên theo quy định sau:
Tên Project: **<MASV>_ProgramXX**
Ví dụ: Sinh viên có masv: CE123456. Tên Project được đặt tên như sau:

CE123456_Program**01**
CE123456_Program**02**
CE123456_Program**03**
CE123456_Program**04**
CE123456_Program**05**
…..

Nén tất cả bài làm lại với tên: `submit.zip`

Sau đó submit bài làm (`submit.zip`) vào mục **Assignment/Lab01** trên EduNext.

Deadline: 14/09/2024, 23:59

Lưu ý các yêu cầu (tham khảo tiêu chí đánh giá các bài lab/assignment):

- Comment giải thuật đầy đủ,
- Format code,
- Thông tin phần author,
- .jar file,
- Output format.

Contents: 08 programs

Program 1 (1 marks)

Write the program that allows the user to enter the three edges (**a**, **b** and **c**) of the triangle then calculates the perimeter and area of the triangle. The program must check that the three input numbers can make a triangle or not.

Formula

Perimeter $= a + b + c$

Area $= \sqrt{p * (p - a) * (p - b) * (p - c)}$ (p = Perimeter / 2)

Hint: *use the function* ***double sqrt (double n)*** *of the* ***Math*** *library (java.lang) to calculate the square root of the parameter* ***n***.

Example 1:	`Please enter the first edge of triangle: -9`
	`Please enter the second edge of triangle: 7`
	`Please enter the third edge of triangle: 5`
	`These three numbers must be a positive number!`

Example 2:	`Please enter the first edge of triangle: 4`
	`Please enter the second edge of triangle: -9`
	`Please enter the third edge of triangle: 0`
	`These three numbers must be a positive number!`

Example 3:	`Please enter the first edge of triangle: 1`
	`Please enter the second edge of triangle: 2`
	`Please enter the third edge of triangle: 10`
	`These three numbers do not make a triangle!`

Example 4:	`Please enter the first edge of triangle: 4`
	`Please enter the second edge of triangle: 5`
	`Please enter the third edge of triangle: 6`
	`The perimeter of the triangle is 15`
	`The area of the triangle is 9.921567`

Program 2 (1 marks)

Write a program that allows the user to enter the height (**h**) and the base's radius (**r**) of the cylinder and then calculates the total surface area and volume of the cylinder. The program must check whether the height and the radius is a positive number or not.

Formula

Perimeter of base (pb) = 2 * π * r
Area of base (ab) = π * r * r
Total surface area (tsa) = h * pb + 2 * ab
Volume (v) = h * ab

Note: **The value of π is** *3.14159265358979323846* **(use the constant** `Math.PI` **of the** `java.lang.Math` **library)**

Example 1:	`Please enter the base's radius of the cylinder: -2`
	`Please enter the height of the cylinder: 0`
	`The height and radius of cylinder must be a positive number!`

Example 2:	`Please enter the base's radius of the cylinder: 1`
	`Please enter the height of the cylinder: 2`
	`The total surface area of the cylinder is 18.8495559215`
	`The volume of the cylinder is 6.2831853072`

Program 3 (1 marks)

Write a program that allows the user to enter dividend called **a** and divisor called **b**. The program must check whether a is **a multiple of b** or not.

Theory

If a is divisible by b, so the remainder of a divided by b is 0 (that mean a % b == 0).
If a is divisible by b then ***a*** *is called a multiple of* ***b*** and ***b*** *is called a divisor of* ***a***.

Example 1:	`Please enter dividend: 23`
	`Please enter divisor : 7`
	`23 is not a multiple of 7`

Example 2:	`Please enter dividend: 100`
	`Please enter divisor : 20`
	`100 is a multiple of 20`

Example 3:	`Please enter dividend: 57`
	`Please enter divisor : 0`
	`The divisor can't be zero!`

Program 4 (1 marks)

Write a program that allows the user to enter two integers called a and b. The program must solves linear equation "A*X + B = 0".

Example 1:	SOLVING LINEAR EQUATION A*X + B = 0 PROGRAM: ---------- Please enter the coefficients A: 0 Please enter the coefficients B: 0 Every value for X is a solution to the linear equation 0*X + 0 = 0
Example 2:	SOLVING LINEAR EQUATION A*X + B = 0 PROGRAM: ---------- Please enter the coefficients A: 0 Please enter the coefficients B: 9 There is no solution for the linear equation 0*X + 9 = 0
Example 3:	SOLVING LINEAR EQUATION A*X + B = 0 PROGRAM: ---------- Please enter the coefficients A: -2 Please enter the coefficients B: 5 The linear equation -2*X + 5 = 0 has an unique root is X = 2.50
Example 4:	SOLVING LINEAR EQUATION A*X + B = 0 PROGRAM: ----------
	Please enter the coefficients A: 10 Please enter the coefficients B: 6 The linear equation 10*X + 6 = 0 has an unique root is X = -0.60

Program 5 (1 marks)

Write a program that calculates the sum S = 1 - 2 + 3 - 4 + ... + (-1^{N+1} * N) and presents the result as the example below.

Example 1:	Please enter positive integer N: -7 Accept positive number only!
Example 2:	Please enter positive integer N: 1 The sum is S = 1

Example 3:	Please enter positive integer N: 11 The sum is S = 1 - 2 + 3 - 4 + 5 - 6 + 7 – 8 + 9 – 10 + 11 = 6

Program 6 (1 marks)

Write a program that calculates the sum:

$$S = \frac{1!}{2^0} + \frac{2!}{2^1} + \ldots + \frac{N!}{2^{N-1}}$$

And presents the result as the example below.

Example 1:	Please enter positive integer N: 0 Accept positive number only!
Example 2:	Please enter positive integer N: 1 The sum is S = 1
Example 3:	Please enter positive integer N: 5 The sum is S = 1!/2^0 + 2!/2^1 + 3!/2^2 + 4!/2^3 + 5!/2^4 = 14.00

Program 7 (1 marks)

Write a program that calculates the factorial **N! = 1 * 2 * 3 * ... * N** and presents the result as the example below

Example 1:	Please enter positive integer N: -7 N must be greater than or equal 0!
Example 2:	Please enter positive integer N: 0 Result: 0! = 1
Example 3:	Please enter positive integer N: 9 Result: 9! = 1*2*3*4*5*6*7*8*9 = 362880!
Example 4:	Please enter positive integer N: 20 Result: 20! = 1*2*3*4*5*6*7*8*9*10*11*12*13*14*15*16*17*18*19*20 = 2432902008176640000

Program 8 (3 marks)

Write a program that allows users to enter a numeric array with N elements. The program performs the functions:

1. The entered array is:

2. The reverse array is:

3. The minimum value of the numeric array is

4. The maximum value of the numeric array is

5. All the prime numbers in the array is/are

Example 1:	How many element of numeric array? 0 The number of element of numeric array must be greater than 0!
Example 2:	How many element of numeric array? 10 Please enter value for 10 elements: Value of the **1st** element is: 19 Value of the **2nd** element is: 28 Value of the **3rd** element is: 3
	Value of the **4th** element is: 482 Value of the 5th element is: 12 Value of the 6th element is: 5 Value of the 7th element is: 41 Value of the 8th element is: 156 Value of the 9th element is: 300 Value of the 10th element is: 184 ********** 1. The entered array is: 19, 28, 3, 482, 12, 5, 41, 156, 300, 184 2. The reverse array is: 184, 300, 156, 41, 5, 12, 482, 3, 28, 19 3. The minimum value of the numeric array is 3 4. The maximum value of the numeric array is 482 5. All the prime numbers in the array is/are 19 3 5 41

END