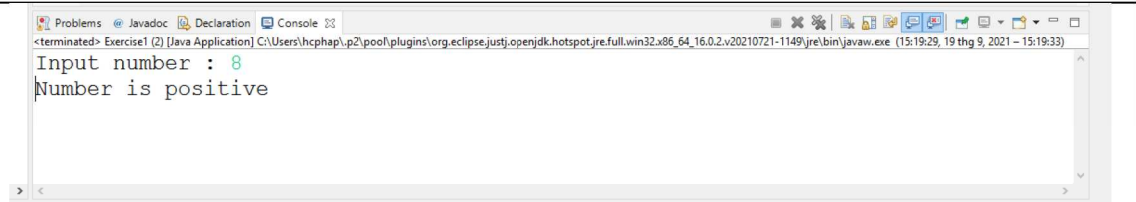


Chapter 3. Java fundamentals and control structures

I. Exercises with solutions

1. Write an OOP program to get a integer from the keyboard and check if it positive, negative or zero?

```
import java.util.Scanner;
public class Exercisel {
    public static void main(String[] args) {
        Scanner k=new Scanner(System.in);
        System.out.print("Input number : ");
        int n=k.nextInt();
        if(n==0) System.out.print("Zero");
        else
            if(n>0) System.out.print("Number is positive");
            else System.out.print("Number is negative");
    }
}
```



2. Write an OOP program to solve a quadratic equation ($ax^2 + bx + c = 0$)

```
import java.util.Scanner;

public class QuadractiEquation {
    public static void main(String[] args) {

        float a,b,c,x1,x2,del;

        Scanner keyboard= new Scanner(System.in);

        System.out.print("a = ");
        a = keyboard.nextFloat();

        System.out.print("b = ");
        b = keyboard.nextFloat();

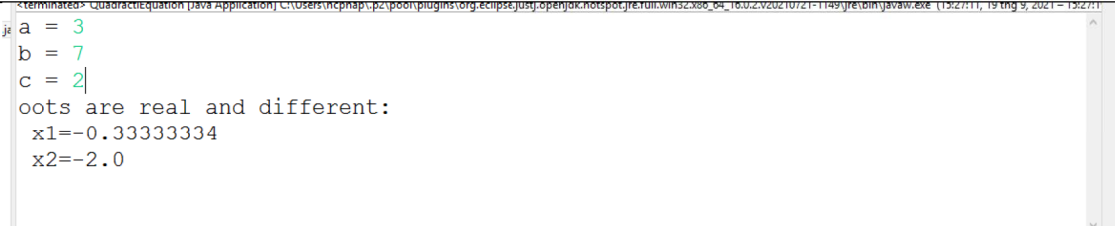
        System.out.print("c = ");
        c = keyboard.nextFloat();

        del = b*b - 4*a*c;
        if (del < 0) System.out.println("Roots are complex
                                        and different");
        else
```

```

        if (del==0)
        {
            x1=x2=-b/(2*a);
            System.out.println("Roots are real and same: "+x1);
        }
        else //means del > 0
        {
            x1=(float) (-b+Math.sqrt(del))/(2*a);
            x2=(float) (-b-Math.sqrt(del))/(2*a);
            System.out.println("Roots are real and different:
                                \n x1="+x1+"\n x2="+x2);
        }
    }
}

```



Requirement: Students must complete the code above for complex roots

- Write an OOP program allowing users to input three numbers (a, b, c) from keyboard. Check if a, b, c numbers are 3 edges of a triangle? If yes, print out the type of triangle?

```

import java.util.Scanner;

public class TriangleCheck {

    public static void main(String[] args) {

        float a,b,c;

        //nhập dữ liệu từ bàn phím
        Scanner keyboard = new Scanner(System.in);
        System.out.print("a = ");
        a = keyboard.nextFloat();

        System.out.print("b = ");
        b = keyboard.nextFloat();

        System.out.print("c = ");
        c = keyboard.nextFloat();

        /*Check if 3 triangle edges are valid*/
    }
}

```

```

if ((a+b>c) && (a+c>b) && (b+c>a) && (a>0) && (b>0) && (c> 0))
{
    System.out.print("a, b, c are valid \n");

    /*Get type of the triangle*/
    if ((a==b) && (b==c)) System.out.println("Equilateral
triangle");
    else
        if ((a==b) || (b==c) || (a==c))
System.out.println("Isosceles triangle");
    else
        if
        (((a*a+b*b==c*c) && (a==b)) || ((a*a+c*c==b*b) && (a==c))
        || ((c*c+b*b==a*a) && (c==b)))
            System.out.println("Isosceles right
triangle");
        else
            if ((a*a==b*b+c*c) || (b*b==a*a+c*c) || (c*c==a*a+b*b))
                System.out.println("Right triangle");
            else
                System.out.println("Triangle");
        }
    else //belong to the first if
        System.out.println("\na, b, c are NOT valid \n");
}
}

```

4. Write an OOP program to sum all even numbers from 2 to N.

```

import java.util.Scanner;
public class SumEven
{
    public static void main(String[] args)
    {
        Scanner keyboard = new Scanner(System.in);
        System.out.print("N = ");
        int N = keyboard.nextInt();

        int sum =0;
        for (int i=1;i<=N;i+=1)
            if (i%2==0) sum+=i;

        System.out.println("Sum = "+sum);
    }
}

```

5. Write an OOP program to check whether N ($N > 0$), which got from the keyboard, is a prime number or not?

```
import java.util.Scanner;
public class PrimeNumber {
    public static void main(String[] args)
    {
        int N;
        int i;

        Scanner keyboard = new Scanner(System.in);
        System.out.print("N = ");
        N = keyboard.nextInt();

        /*Kiểm tra số nguyên tố*/

        for (i=2;i<=Math.round(Math.sqrt(N));i++)
            if (N%i==0) break; /*Nếu chia hết cho một số i thì N
                                không phải số nguyên tố*/

        /*Nếu i nhỏ hơn hoặc bằng căn bậc 2 N có nghĩa vòng lặp bị kết
        thúc bằng câu lệnh break*/
        if (i <= Math.round(Math.sqrt(N)))
            System.out.print("N is not a prime number ");
        else System.out.print("N is a prime number ");
    }
}

<terminated> PrimeNumber [Java Application] C:\Users\hchp\p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_16.0.2.v20210721-1149\jre\bin\javaw.exe (15:53:30, 19 thg 9, 2021 - 15:53:34)
N = 7
N is a prime number
```

II. Do it yourself

1. Write an application that prints all of integer the numbers between 1 (included) and 100 (included) using the “while” loop.
2. Write an application that prints all of the integer numbers between 1 (included) and 100 (included) using the “do..while” loop.
3. Write an application that prints all of the integer numbers between 1 (included) and 100 (included) using the “for” loop.
4. Write an application that prints all of the even numbers between 1 (included) and 100 (included) using the “while” loop.

5. Write an application that prints all of the even numbers between 1 (included) and 100 (included) using the “do..while” loop.
6. Write an application that prints all of the even numbers between 1 (included) and 100 (included) using the “for” loop.
7. Write an application that calculates the sum of all the integer numbers between 1 (included) and 100 (included).
8. Write an application that calculates and prints the average of all the integer numbers between 1 (included) and 100 (included).
9. Write an application that calculates and prints the biggest number between 1 (included) and 100 (included) that divides in 7 without a residual.
10. Write an application that calculates the sum of all the numbers between 1 (included) and 100 (included) that divide in 7 without a residual.
11. Write an application that prints all of the integer numbers between 1 (included) and 1000 (included) and near each one of them (each number will be printed in a new line) it prints EVEN or UNEVEN.
12. Write an application that prints a rectangle of stars as follows:

```

* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
    
```

13. Write an application that prints a shape of stars as follows:

```

* * * * *
  * * * *
    * * *
      * *
        *
      * * * *
    * * * *
  * * * *
* * * * *
    
```

14. Write an application that prints to the screen the following:

```

      *
     * *
    * * *
   * * * *
  * * * * *
 * * * * *
    
```

15. Write an application that prints to the screen the following:

```

      *
     * *
    * * *
   * * * *
  * * * * *
 * * * * *
    
```

* * *
*

16. Write an application that prints to the screen the following series:

0, 3, 8, 15, 24, 35, 48, . . .

17. Write an application that prints to the screen the following series:

1, 3, 7, 15, 31, 63, . . .

18. Write an application that prints to the screen the following series:

1, 7, 16, 37, 79, 173

The application should print the first 10 numbers of the series.

19. Write an application that prints to the screen the following series:

1, 3, 9, 27, 81, 243

The application should print the first 10 numbers of the series.

20. The following application prints the factorial of 6. The computation of 6! is done using a static method that calculates the factorial of the number that it gets. Complete the missing lines.

```
class FactorialApplication
{
    public static void main(String args[])
    {
        long number, result;
        number = 6;
        result = factorial(number);
        System.out.println("The factorial of 6 is : " + result);
    }
    public static long factorial(long value)
    {
        long result = 1;

        //add the missing lines here
        return result;
    }
}
```

21. Develop a stand-alone application that prints each one of the numbers between 0 and FFFF (the numbers should be printed in Hexadecimal base).
22. Develop a stand-alone application that prints each one of the numbers between 0 and 777 (the numbers should be printed in Octal base).