

IIP

Test Unit 6 - Possible solution

Year 2015-2016

Name:

1. The sinus of a real number can be approximated by the sum of a series of terms $\sin(x) \approx \sum_{i=0}^n u_i$, where $u_0 = x$ and $u_i = -\frac{x^2}{2i(2i+1)}u_{i-1}$ for $i > 0$. Implement a class method that receives the values of x and n and returns the approximation of $\sin(x)$ based on this recurrence.

```
public static double sinus(double x, int n) {
    double t=x, s=x;
    int i;

    for (i=1;i<=n;i++) {
        t = -t * (x*x) / ((2*i) * (2*i+1));
        s += t;
    }

    return s;
}
```

2. Implement a Java class method that receives two **String** and prints alternatively the characters of the two **String** parameters. When one **String** is shorter than the other, when that **String** is finished the process stops. E.g., for "Java" and "program", it will print Jparvoag.

```
public static void mixStrings(String s1, String s2) {
    int i=0;

    while (i<s1.length() && i<s2.length()) {
        System.out.print(s1.charAt(i));
        System.out.print(s2.charAt(i));
        i++;
    }
    System.out.println();
}
```

3. Implement a program class that reads for a positive integer n and prints on the screen the following figure, where the side length is equal to n .

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

The previous case is for $n = 7$.

```
import java.util.*;

public class Flag {
    public static void main(String [] args) {
        Scanner kbd=new Scanner(System.in).useLocale(Locale.US);
        int n, i, j;

        n=kbd.nextInt();

        for (i=1;i<=n;i++) {

            /***** Initial version *****/

            if (i==1 || i==n) {          // First and last line are full of *
                for (j=1;j<=n;j++) {
                    System.out.print("*");
                }
            }
            else {                        // Rest of lines
                System.out.print("*");    // First column

                for (j=2;j<=n-1;j++) {    // From 2nd to last-1 column
                    if (i==j)             // Diagonal
                        System.out.print("*");
                    else                   // No diagonal
                        System.out.print(" ");
                }

                System.out.print("*");    // Last column
            }

            /***** End initial version *****/

            /***** Alternative version *****/
            for (j=1;j<=n;j++)
                if (i==1 || i==n || j==1 || j==n || i==j) System.out.print("*");
                else System.out.print(" ");
            /***** End alternative version *****/

            System.out.println();        // Jumps to new line
        }
    }
}
```