IIP

Test Unit 7

Year 2013-2014

Name:

1. A way of calculating the π number is by using the Euler formula:

$$\frac{\pi}{2} = \sum_{n=0}^{\infty} \frac{2^n n!^2}{(2n+1)!} = \sum_{n=0}^{\infty} u_n$$

where $u_0 = 1$ and $u_n = u_{n-1} \frac{n}{2n+1}$. Since each term is lower than the previous and it is a summatory, the error is lower than the last term calculated.

Write a Java static method that given a small real value *epsilon* (*epsilon* > 0), calculates, using the Euler formula described previously, the value π with an error lower than *epsilon*.

```
public static double pi(double eps) {
  double p=1, t=1;
  int i=1;

  while (2*t>eps) {
    t=t*i/(2*i+1);
    p+=t;
    i++;
  }

  return 2*p;
}
```

2. Write a Java static method that receives a `String` and a `char` parameter and returns how many times appears the character in the string.

```
public static int occurrences(String s, char c) {
  int i, a=0;
  for (i=0;i<s.length();i++)
    if (s.charAt(i)==c) a++;
  return a;
}
```

3. Write a Java program class whose `main` method shows on the screen the following figure, by using spaces and asterisks.

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

The number of lines of the figure must be asked to the user previously to the drawing (i.e., the shown example is for `n=5`).

```
import java.util.*;

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

    n=kbd.nextInt();

    for (i=1;i<=n;i++) {
      for (j=0;j<(n-i);j++) System.out.print(" ");
      for (j=0;j<2*i-1;j++) System.out.print("*");
      System.out.println();
    }
  }
}
```