ESC101 : Fundamental of Computing
Lab 2 for 12th August 2008

1. **Finding the divisor amongst 3, 7 and 21 :**
   Declare and initialize a variable `num` of type `int`. Find the largest number amongst 3, 7 and 21 that divides `num`.

2. **Exact power of 2 :**
   Declare a variable `num` of type `int`. Assign it some positive value. Write a JAVA program to find whether `num` is a power of 2.

   e.g. $1, 2, 4, 8, 16 \ldots$ are exact powers of 2.

3. **Print an arrow-head of a given size :**
   You have to write a program to print an arrow-head of a given size. For example, the following diagram shows an arrow-head of size 6. Declare and initialize a variable `s` of type `int`. Then write JAVA code to print an arrow-head of size `s`.

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   Hint: First write a `for` loop to print '*' a given number of times in a line. You might have to use `System.out.print` statement in addition to `System.out.println` statement. Now in order to get the above pattern, write one more `for` loop which encloses the above `for` loop.

Exploratory problem [this problem is optional and not to be graded]:
Write a JAVA program in which you first declare two integers `a` and `b`. Set them to various values as described below and compute `a/b` and `a%b`.

1. $a > 0$ and $b > 0$
2. $a > 0$ and $b < 0$
3. $a < 0$ and $b > 0$
4. $a < 0$ and $b < 0$

Can you conclude the following assertions ?

1. In case a is not a multiple of b, let x be the integer such that the exact quotient obtained by dividing a by b lies in interval $(x, x+1)$. Then for all the four cases mentioned above, the value of a/b computed by JAVA will be that integer from $\{x, x+1\}$ which is closer to zero.
2. $b(a/b) + a\%b = a$ for all the four cases of a and b.