**ICS4U Recursion project**

1. The Fibonacci sequence consists of the numbers

1, 1, 2, 3, 5, 8, …

and can be defined recursively as follows:

1 if n = 1

f(n) = 1 if n = 2

f (n-1) + f (n – 2) if n > 2

* 1. Write a recursive method Fibonacci with an integer parameter n. the method should return the nth term of the Fibonacci sequence. (if (n< 1, the method should produce an error message and return the value zero.)
  2. How many calls are made tp Fibonacci in computing the value of the fifth term of the Fibonacci sequence?

Save file as Fibonacci\_yourName.java

1. To compute the value of xn, where n is a positive integer; a recursive solution can be obtained using the following relations:

For example, 46 = (43)2

= ((4) x 4)2

Once the expression has been factored, we can then evaluate it with only a few multiplications. Using the preceding example, we have

46 = ((4)2 x 4)2

= (16 x 4)2 = (64)2 = 4096

1. Using the given relationships to write each power in factored form.
   1. X 10
   2. X 25
   3. X 100
2. How many multiplications would be needed to evaluate each of the factored expressions found in part (a)?
3. Write a recursive method power with double parameter x and int parameter n, that use the given relationships to find the value of xn. In your method, assume that n > 0
4. Extend your method so that it gives correct answer for any integral exponent. (The method should return NaN as the value of 00.)

Save your file as Recursion\_yourName

1. Consider the pattern shown in the following diagram to be of size 4 because the longest row contains four \*

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Write a recursive method printPattern that will pint a pattern like the one shown here. The method should have a single parameter n that specified the length of the longest row in the pattern. If n is less than 1, the method should print nothing.

Save file as prinPattern\_yourName.java