Practical IB Computer Science Test #1

Name: _____ Date: _____

Fibonacci Numbers

Your program will calculate and print out a term of the Fibonacci sequence. For example, the first terms of the Fibonacci sequence are

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

The next number is found by adding up the two numbers before it. We start with 0 and 1 as the first two terms of the sequence.

$x_0 = 0$; $x_1 = 1$; $x_2 = 1$; $x_3 = 2$; $x_4 = 3$; $x_5 = 5$; $x_6 = 8$; $x_7 = 13$; $x_8 = 21$; $x_9 = 34$;...

- The 2 (x_3) is found by adding the two numbers before it, 1+1 ($x_1 + x_2$)
- Similarly, the 3 (x_4) is found by adding the two numbers before it, 1+2 ($x_2 + x_3$),
- The 5 (x_5) is 2+3 ($x_3 + x_4$),
- and so on ($x_n = x_{n-2} + x_{n-1}$ or $x_n = x_{n-1} + x_{n-2}$)

Example: the next number in the sequence above would be 21 + 34 = 55 ($x_8 + x_9 = x_{10}$)

The terms are numbered from 0 onwards, like this:

n =	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	…
x_n =	0	1	1	2	3	5	8	13	21	34	55	89	144	233	377	…

(http://www.mathsisfun.com/numbers/fibonacci-sequence.html)

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Work through the test from the beginning. Your program should build and grow –do not start a new program for each point. During this test, you may use any resources that you have created, but you may **not** use Internet. You may use our online class resources.

Instructions	***Program Display***
1. Output your name on the screen.	*Darth Vader*
2. Input a number "***n***".	*Calculate up to term (n)?* **6**
3. Output an error message if the number is negative.	*Calculate up to term (n)?* **-5** *Error- enter a positive number.*
4. Only accept inputs of a positive number. Repeat input until an acceptable number is entered.	*Calculate up to term (n)?* **-5** *Error- enter a positive number.* *Calculate up to term (n)?* **10**
5. Calculate up to term ***n*** of the Fibonacci sequence. Example shows output for ***n*** = 10 (remember ***n*** starts from 0).	*Calculate up to term (n)?* **10** *0 1 1 2 3 5 8 13 21 34 55*
6. Output the sequence as a semi-colon separated list. Example shows output for ***n*** = 20.	*0; 1; 1; 2; 3; 5; 8; 13; 21; 34; 55; 89; 144; 233; 377; 610; 987; 1597; 2584; 4181; 6765*
7. Output only term ***n*** of the sequence, if ***n*** > 20.	*Calculate up to term (n)?* **50** *Term 50: 12586269025*
8. Calculate and output the average of ***n*** terms of the sequence.	*Calculate up to term (n)? 5* *0; 1; 1; 2; 3; 5* *Average = 2.4*
9. Make the program repeat until zero is input.	*Calculate up to term (n)? 5* *0; 1; 1; 2; 3; 5* *Average = 2.4* *Calculate up to term (n)? 10* *0; 1; 1; 2; 3; 5; 8; 13; 21; 34; 55* *Average = 14.3* *Calculate up to term (n)? 0*
10. Count how many digits the term has and output the result.	*Calculate up to term (n)? 50* *12586269025* *Average = 6.5902560196E8* *12586269025 has 11 digits*

Submit your Java source code file to the corresponding online homework entry when you are done / before the end of the period. Good luck!