

<pre> 1 def fib(): 2 limit = 50 3 a = 0 4 b = 1 5 c = 0 6 d = 0 7 while c < limit: 8 c = a + b 9 print d, c 10 d = d + 1 11 a = b 12 b = c 13 14 fib() </pre>	<p>Output of this program:</p> <p>→</p>	<table border="0"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">d</th> <th style="text-align: left; border-bottom: 1px solid black;">c</th> </tr> </thead> <tbody> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>3</td></tr> <tr><td>3</td><td>5</td></tr> <tr><td>4</td><td>8</td></tr> <tr><td>5</td><td>13</td></tr> <tr><td>6</td><td>21</td></tr> <tr><td>7</td><td>34</td></tr> <tr><td>8</td><td>55</td></tr> </tbody> </table>	d	c	0	1	1	2	2	3	3	5	4	8	5	13	6	21	7	34	8	55
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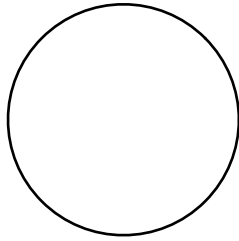
```

1 public class Exam3 {
2     static void notfib() {
3         int limit = 30;
4         int a = 4;
5         int b = 2;
6         int c = 0;
7         int d = 1;
8         while (c < limit) {
9             c = a + b;
10            System.out.println(d + " " + c);
11            d = d * 2;
12            a = b;
13            b = c;
14        }
15        System.out.println("After: " + d + " " + c);
16    }
17
18    public static void main(String[] args) {
19        notfib();
20    }
21 }

```

CSCI 1300 Exam 3
Spring 2013

Programming Concepts in
Python and Java



Write Clearly!

Name: _____

9-Digit Student ID: _____

TA (circle one):

Frank	Halley	Jaeheon
Jing	Mahnaz	Don't Know

Several questions refer to the Python and Java programs containing the 'fib' and 'notfib' functions. It is stapled to the front of this exam.

1. Remove the page with the source code that is stapled to the front of the exam, and write something witty (or not) on this line: (1 point)

just to ensure people take page off

2. (a) (2 points) If we moved Python line 14 to the top of the program, so **fib()** appears before **def fib():**, the interpreter gives us the following complaint:

NameError: name 'fib' is not defined

What does this mean?

the function is not yet defined because the interpreter hasn't seen it yet.

(b) (2 points) Under which conditions will the 'while' loop on Python line 7 terminate?

when $c \geq \text{limit}$ (limit is 50, so "when $c \geq 50$ " is ok too). "greater than 50" isn't quite right.

(c) (2 points) Why is the last line of Python output **8 55** and not **7 34**?

the value of c becomes larger than the limit, but the remainder of the while loop executes before the loop is terminated.

3. **Now look at the Java program.** It has similar structure to the Python one, but beyond syntactic differences with Python, it has several key differences. For example, the initial value of 'a' is 4.

(a) (3 points) Fill in the table to the right. Each line should have the output of line 10 as the while loop commences. Refer to the Python version's output to get a sense for what we mean. *Not all lines may be needed.* Ignore line 15 for the moment.

d	c
1	6
2	8
4	14
8	22
16	36

(b) (3 points) What does line 15 print out?

After: 32 36

(just 32 36 works too)

(c) (2 points) Why does the Java version need to define the class **Exam3**? (Consider what happens if we don't define a class at all?)

Java source files must contain classes. Everything is part of a class. Compiler would complain if it was not there.

(d) (3 points) Can we deduce the name of the file that contains the Java program? If so, what is the file name? *Be completely accurate.*

Yes, it is Exam3.java

(e) (2 points) Say we have a Java source file called **Thingy.java**, and we compile it. What is the name of the file it produces?

javac produces java byte code in a file named Thingy.class

(f) (2 points) The Java version of the **notfib** function definition has more information than Python's **fib** definition. Specifically, it uses the word **void**. What does **void** mean in Java?

void means 'no value'. It indicates that a function does not return anything.

```

public class Wonderful {
    public static void main(String[] args) {
        // create an array with the given integers
        int[] input = new int[] { -3, -2, -1, 0, 1, 2 };
        int sum = 0;
        int product = 1;
        int count = 0;
        for (int i=0; i < input.length; i++) {
            sum = sum + input[i];
            product = product * input[i];
            count = count + 1;
        }
        System.out.println("Sum: " + sum);
        System.out.println("Product: " + product);
        System.out.println("Count: " + count);
    }
}

```

4. These questions relate to the **Wonderful** class above.

(a) (4 points) What does the code output?

Sum: **Sum: -3**
 Product: **Product: 0**
 Count: **Count: 6**

(b) (2 points) If we changed the initial values of sum and product to be **sum = 10;** and **product = 187238;** what would this modified code output? (Hint: this does not involve doing a lot of arithmetic.)

Sum: **Sum: 7**
 Product: **Product: 0**
 Count: **Count: 6**

(c) (1 points) After the input array is initialized, what is the *data type* of input[3]?

int

(d) (1 points) Similarly, what is the *value* of input[3]?

0