Answer all questions in the space provided. Write clearly and legibly, you will not get credit for illegible or incomprehensible answers. This is a closed book exam. However, each student is allowed to bring one page of notes to the exam. Print your name at the top of every page.

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1. Multiple choice questions

(a) Which of the following is an integer type?  
   A. boolean B. char C. double D. float E. long

(b) If you wanted to store my cat’s name in a variable, which of the following types would be best?  
   A. boolean B. char C. double D. int E. String

(c) If you wanted to store the number of cats in my house in a variable, which of the following types would be best?  
   A. boolean B. char C. double D. int E. String

(d) Which code could you use to create an array that could hold 50 integer values?  
   A. int values[50];  
   B. int[50] values;  
   C. int values = new int[50];  
   D. int values = new int(50);  
   E. int[] values = int[50];  
   F. int[] values = new int[50];  
   G. int[50] values = new array(int);

(e) What is the value of the following expression? "one" + 2 + 3 * 4  
   A. "one234"  
   B. "one212"  
   C. "one14"  
   D. 15  
   E. This expression would result in a compilation error.

(f) Which of the following expressions would evaluate to 3.5?  
   A. 7 / 2  
   B. (double)(7 / 2)  
   C. (double)7 / 2  
   D. 7 / (int) 2.0  
   E. (int)(7.0 / 2.0)
2. Why do the following code snippets not compile? (Explain in one sentence each.)

(a) int x;
5 = x;  

(b) int i = 2;
int j = 4;
int k = 6;
if(i < j < k) {
    System.out.println(i + " is smallest");
}

(c) public static String myMethod(int x) {
    if(x > 5) {
        return "bigger than five!";
    }
}

(d) boolean do = true;
3. The following Java program compiles and runs. What is its output? 

```java
public class IfTest
{
    public static void main(String[] args)
    {
        int x = 14;
        int y = 21;
        int z = 2;
        if (x > 10) {
            System.out.println("A");
            if (y > 20) {
                System.out.println("B");
            } else if (z > 2) {
                System.out.println("C");
            } else {
                System.out.println("D");
            }
            System.out.println("E");
        } else if (x > 15) {
            System.out.println("F");
            if (y < 10) {
                System.out.println("G");
            } else if (z < 1) {
                System.out.println("H");
            } else {
                System.out.println("J");
            }
            System.out.println("K");
        } else if (z < 1) {
            System.out.println("L");
            if (y < 20) {
                System.out.println("M");
            } else if (x < 20) {
                System.out.println("N");
            } else {
                System.out.println("P");
            }
        }
        if (y > 10) {
            System.out.println("Q");
            if (x > 0) { System.out.println("R"); }
        } else if (z > 1) {
            System.out.println("S");
        } else if (y > 10) {
            System.out.println("T");
            if (x > 0) { System.out.println("W"); }
            System.out.println("X");
        }
    }
}
```
4. The following Java program compiles and runs. What is its output? (10)

```java
public class Fib {

    public static int fillFibArray(int[] fib) {
        fib[0] = 1;
        fib[1] = 1;
        for (int i = 2; i < fib.length; i++) {
            fib[i] = fib[i-1] + fib[i-2];
        }
        return fib.length;
    }

    public static void main(String[] args) {

        int n = 42;
        int[] arr = {2, 4, 6, 8, 10, 12, 14, 16, 18};

        n = fillFibArray(arr);
        System.out.println("n = " + n);

        for (int i = 0; i < arr.length; i++) {
            System.out.println("arr[" + i + "] = " + arr[i]);
        }
    }
}
```
5. The following Java program compiles and runs. What is its output? (10)

```java
public class LoopTest {
    public static void main(String[] args) {
        int n = 3;
        for(int i = 0; i < 30; i += 5) {
            System.out.println("i = " + i);
            while(n < i) {
                System.out.println("n = " + n);
                n *= 2;
            }
        }
    }
}
```
6. Write a method that returns the number of times that the String "hi" appears anywhere in the given String.

   countHi("abc hi ho") → 1
   countHi("ABChi hi") → 2
   countHi("hihi") → 2
   countHi("hiHhi") → 2
   countHi("h") → 0
   countHi("hello") → 0

```java
public static int countHi(String str) {
```