Name:_____ NetID:_____

Answer all questions in the space provided. Write clearly and legibly, you will not get credit for illegible or incomprehensible answers. Print your name at the top of every page.

This is a closed book exam. However, each student is allowed to bring one page of notes to the exam. Also, you are permitted the use of a "dumb" calculator to perform basic arithmetic.

| Question: | 1 | 2 | 3 | 4 | 5 | 6 | Total |
|---|---|---|---|---|---|---|---|
| Points: | 14 | 15 | 15 | 15 | 15 | 10 | 84 |
| Score: | | | | | | | |

1. Select the single *best* answer for each of the following questions.

   (a) Which of the following is a floating point type? (2)

   A. boolean   B. char   C. double   D. int   E. long   F. short   G. String

   (b) Which of the following is *not* a primitive type? (2)

   A. boolean   B. char   C. double   D. int   E. long   F. short   G. String

   (c) If you wanted to store your exact height in meters in a variable, which of the following types would be best? (2)

   A. boolean   B. char   C. double   D. int   E. long   F. short   G. String

   (d) If you wanted to store your name in a variable, which of the following types would be best? (2)

   A. boolean   B. char   C. double   D. int   E. long   F. short   G. String

   (e) Which of the following expressions would *not* evaluate to 2.5? (2)

   A. 5.0/2.0   B. 5.0/2   C. (double)5/2   D. (double)(5/2)   E. 5.0/(int)2.0

   (f) Which code could you use to create an array that could hold 100 boolean values? (2)

   ```
   A. boolean values[100];
   B. boolean[100] values;
   C. boolean[100] values = new array(boolean);
   D. boolean values = new boolean(100);
   E. boolean values = new boolean[100];
   F. boolean[] values = new boolean[100];
   G. boolean[] values = boolean[100];
   H. boolean[] values = new boolean(100);
   ```

   (g) What is the value of the following expression? (2)

   ```
   1 + 2 + "3" + 4 + 5
   ```

   ```
   A. 12345
   B. 15
   C. "12345"
   D. "15"
   E. "3345"
   F. "339"
   ```
   G. The value of this expression is undefined.

2. Why do the following code snippets not compile? Explain in one sentence each.

(a)                                                                                    (3)
```
String greeting = "hello"
```

(b)                                                                                    (3)
```
int single = 1;
int double = 2;
```

(c)                                                                                    (3)
```
int n = 1;
while (0 < n < 10) {
    n += 3;
}
```

(d)                                                                                    (3)
```
public static int findSmaller(int x, int y) {
    if( x < y ) {
        System.out.println("first is smaller");
        return x;
    } else {
        System.out.println(y + "is smaller (or equal)");
    }
}
```

(e)                                                                                    (3)
```
public static void printIfEqual(int x, int y) {
    if( x = y ) {
        System.out.println("equal values");
    }
}
```

3. The following Java program compiles and runs. What is its output?                    (15)

```java
public class IfTest {

    public static void main(String[] args) {

        int foo = 15;
        int bar = 13;
        int baz = 9;

        if(foo < 10) {
            System.out.println("this");
            if(bar < baz) {
                System.out.println("code");
            } else if(foo < bar) {
                System.out.println("is");
            } else {
                System.out.println("not");
            }
            System.out.println("a");
        } else if(bar < 20) {
            System.out.println("print");
            if( baz % 3 == 0 ) {
                System.out.println("out");
            }
            System.out.println("the");
        } else {
            System.out.println("write");
            if(foo + bar < baz) {
                System.out.println("my");
            } else {
                System.out.println("your");
            }
        }

        if(foo % 3 == 1) {
            if(foo - bar == baz) {
                System.out.println("valid");
            }
            System.out.println("output");
        } else if(baz < 10) {
            if(bar % 2 != 0) {
                System.out.println("right");
            } else {
                System.out.println("correct");
            }
            System.out.println("answer");
        }
    }
}
```

4. The following Java program compiles and runs. What is its output?                    (15)

```java
public class LoopTest {

    public static void main(String[] args) {

        int n = 16;

        while (n > 2) {

            System.out.println("outer: n = " + n);

            for(int i = n; i < 10; i +=3) {
                System.out.println("inner: i = " + i + ", n = " + n);
            }

            n /= 2;
        }

        System.out.println("final: n = " + n);
    }

}
```

5. The following Java program compiles and runs. What is its output?          (15)

```java
public class ArrayTest {

    public static int foo(int[] vals, int b) {

        int a = b % 5;

        System.out.println("foo: "+ vals[a] + ", a = " + a + ", b = " + b);
        vals[a] = a + b;
        return vals[a];
    }

    public static void main(String[] args) {

        int a = 8;
        int b = 6;
        int[] arr = {5, 4, 3, 2, 1};

        int x = foo(arr, a);
        System.out.println("main1: " + a + ", " + x);

        x = foo(arr, b);
        System.out.println("main2: " + b + ", " + x);

        for(int i = 0; i < arr.length; i++) {
            System.out.println("arr[" + i + "] = " + arr[i]);
        }
    }
}
```

6. Return the number of times that the string `"code"` appears anywhere in the given string, except    (10)
   we'll accept any character for the `'d'`, so `"cope"`, `"cooe"`, `"co3e"`, etc. will also count.

   countCode( "aaacodebbb") $\rightarrow$ 1
   countCode( "codexxcode") $\rightarrow$ 2
   countCode( "cozexxcope") $\rightarrow$ 2
   countCode( "cozcop") $\rightarrow$ 0
   countCode( "code") $\rightarrow$ 1
   countCode( "cod") $\rightarrow$ 0
   countCode( "AAcodeBBcoleCCccoreDD") $\rightarrow$ 3

   ```
   public static int countCode(String str) {
   ```