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:	12	18	15	15	15	10	85
Score:							

1. Why do the following code snippets not compile? (Explain in one sentence each.)

(a) (3)

```
String greeting = "hello"
```

(b) (3)

```
boolean break = true;
```

(c) (3)

```
public static boolean compare(int x, int y) {
    if( x < y ) {
        System.out.println("first is smaller");
    } else {
        return false;
    }
}
```

(d) (3)

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

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

   (a) Which of the following is an integer type? (2)

   A. `boolean` B. `char` C. `double` D. `float` E. `long` F. `String`

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

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

   (c) If you wanted to store the exact weight of my cat in kilograms in a variable, which of the following types would be best? (2)

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

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

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

   (e) If you wanted to store the number of cats currently in my house in a variable, which of the following types would be best? (2)

   A. `boolean` B. `char` C. `double` D. `float` E. `int` F. `String`

   (f) Which of the following is *not* a type of loop in Java? (2)

   A. do-while B. for C. enhanced for D. if E. while

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

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

   (h) Which code could you use to create an array that could hold 25 int values? (2)

   A. `int values[25];`
   B. `int[25] values;`
   C. `int[25] values = new array(int);`
   D. `int values = new int(25);`
   E. `int values = new int[25];`
   F. `int[] values = new int[25];`
   G. `int[] values = int[25];`
   H. `int[] values = new int(25);`

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

```
1 + 2 * 3 + "4" + 5 + 6
```

   A. `123456`
   B. `22`
   C. `"123456"`
   D. `"22"`
   E. `"6411"`
   F. `"6456"`
   G. `"7411"`
   H. `"7456"`
   I. The value of this expression is undefined.
   J. This expression would result in a compilation error.

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

```
public class IfTest {

    public static void main(String[] args) {

        int foo = 8;
        int bar = 16;
        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)

```
public class LoopTest {

    public static void main(String[] args) {

        int n = 1;

        while (n < 20) {

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

            for(int i = n; i > 1; i /= 3) {
                System.out.println("inner: i = " + i + ", n = " + n);
            }

            n *= 3;
        }

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

    }
}
```

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

```
public class ArrayTest {

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

        int b = vals[a] % 7;

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

    public static void main(String[] args) {

        int a = 3;
        int b = 1;
        int[] arr = {12, 24, 36, 48, 60};

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

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

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

6. We'll say that a String is xy-balanced if for all the 'x' chars in the string, there exists a 'y' char somewhere later in the string. So "xxy" is balanced, but "xyx" is not. One 'y' can balance multiple 'x's. Write a method that returns true if the given string is xy-balanced, false otherwise. (10)

   I have already given you the method header so you know the parameter and return types. The following examples are just to give you a feel for how it works.

   `xyBalanced( "aaxbby")` → true
   `xyBalanced( "aaxbb")` → false
   `xyBalanced( "yaaxbb")` → false
   `xyBalanced( "xaxxbby")` → true
   `xyBalanced( "aabb")` → true

```
public static boolean xyBalanced(String str) {
```