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	12	15	10	81
Score:							

1. Multiple Choice Questions

   (a) Which of the following is *not* a type of loop in Java?   (2)
       A. do-while   B. for   C. if   D. while

   (b) Which of the following is an integer type?   (2)
       A. `boolean`   B. `float`   C. `double`   D. `long`   E. `String`

   (c) If you wanted to store the title of a book in a variable, which of the following types would be best?   (2)
       A. `boolean`   B. `char`   C. `double`   D. `int`   E. `String`

   (d) If you wanted to store the number of pages in a book in a variable, which of the following types would be best? (2)
       A. `boolean`   B. `char`   C. `double`   D. `int`   E. `String`

   (e) Which of the following expressions would *not* evaluate to `2.5`?   (2)
       A. `5.0 / 2`   B. `(int)5.0 / 2`   C. `5 / 2.0`   D. `(double)5 / 2`   E. `5.0 / (int) 2.0`

   (f) 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.
           H. This expression would result in a compilation error.

   (g) Which code could you use to create an array that could hold 15 character values?   (2)
           A. `char values[15];`
           B. `char[15] values;`
           C. `char values = new char[15];`
           D. `char values = new char(15);`
           E. `char[] values = new char[15];`
           F. `char[] values = char[15];`
           G. `char[15] values = new array(char);`

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

(a)   (3)

```
int single = 1;
int double = 2;
```

(b)   (3)

```
for(int i = 0; i < 10; i++) {
    if(i = 5) {
        System.out.println(i);
    }
}
```

(c)   (3)

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

(d)   (3)

```
public static String myMethod(int x) {
    if( x % 2 == 0 ) {
        return "even";
    }
}
```

(e)   (3)

```
int age = 42
```

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

```java
public class IfTest
{
    public static void main(String[] args)
    {
        int x = 14;
        int y = 19;
        int z = 1;
        if (x > 10) {
            System.out.println("A");
            if (y > 20) {
                System.out.println("B");
            } else if (z < 5) {
                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");
            if (y > 0) { System.out.println("T"); }
        } else if (x > 10) {
            System.out.println("W");
            if (y > 0) { System.out.println("X"); }
        }
    }
}
```

4. The following Java program compiles and runs. What is its output?   (12)

```java
public class LoopTest {

    public static void main(String[] args) {

        int n = 2;

        for(int i = 6; i < 20; i+=5) {

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

            while(i >= n) {
                n *= 2;
                System.out.println("inner: 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 a) {

        int b = a % 5;

        System.out.println("foo: a = " + a + ", b = " + b + ", val = " + vals[b]);
        vals[b] = a / 5;
        return vals[b] + 2;
    }

    public static void main(String[] args) {

        int a = 42;
        int b = 45;
        int[] arr = {1, 2, 3, 4};

        int x = foo(arr, a);
        System.out.println("main1: foo(arr, " + a + ") = " + x);
        System.out.println("main2: foo(arr, " + b + ") = " + foo(arr, b));

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

6. Write a method that takes and array of integers and returns true if every element of the array   (10)
   is a 1 or a 4. Return false if array contains an element that is not a 1 or a 4.

   only14(new int[] {1, 4, 1, 4}) → true
   only14(new int[] {1, 4, 2, 4}) → false
   only14(new int[] {1, 1}) → true
   only14(new int[] {}) → true

```
    public static boolean only14(int[] nums) {
```