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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Score:

1. Multiple choice questions

(a) What is the name of the method that is run when a Java program executes? (3)
   A. class
   B. main
   C. start
   D. static
   E. void

(b) If you wanted to store the value of the square root of 2 in a variable, which of the following types would be best? (3)
   A. boolean
   B. char
   C. double
   D. int
   E. String

(c) Which of the following is not a Java keyword? (3)
   A. for
   B. while
   C. do
   D. if
   E. then
   F. else

(d) Which of the following expressions would evaluate to 1.5? (3)
   A. 3 / 2
   B. (int)3.0 / 2
   C. (double)(3 / 2)
   D. (double)3 / 2
2. Why do the following statements not compile? (Explain in one sentence each.)

(a) boolean break = true;

(b) System.out.println(Hi there!);

(c) if(i = 10) {
    System.out.println(i);
}

(d) for(int i = 1 to 10) {
    System.out.println(i);
}
3. Given the definitions below, evaluate the following boolean expressions to true or false.

```java
boolean apple = true;
boolean orange = false;
boolean banana = true;
boolean kiwi = false;
```

(a) apple && orange  
(a) _________

(b) apple || orange || banana  
(b) _________

(c) !kiwi  
(c) _________

(d) (apple || kiwi) && (orange || kiwi)  
(d) _________

(e) !apple && (!orange || banana || kiwi)  
(e) _________

(f) !apple || (!orange || banana || kiwi)  
(f) _________

4. The following code comes from a solution to the hangman lab. What code is needed on line 15 for the method to work as intended?

```java
/**
 * Checks to see if letter occurs at least once in word. If so, sets the corresponding elements of known to letter and returns true. If not, returns false.
 * @param letter Letter that player has guessed.
 * @param word The word we are checking.
 * @param known Array of letters that player knows.
 * @return True if letter was found in word.
 */
public static boolean foundLetter(char letter, String word, char[] known) {
    boolean found = false;
    for(int i = 0; i < word.length(); i++) {
        if(word.charAt(i) == letter) {
            found = true;  // ??????
        }
    }
    return found;
}
```
5. As you may recall even numbers are numbers that are divisible by 2. The sumEvens method should return the sum of all the even numbers in the given array of numbers, returning 0 for an empty array.

\[
\begin{align*}
[1, 2, 3, 4] & \rightarrow 6 \\
[2, 6, 3, 5] & \rightarrow 8 \\
[3, 5, 1] & \rightarrow 0 \\
[2, 2, 2] & \rightarrow 6 \\
\end{align*}
\]

```java
public static int sumEvens(int[] numbers) {
```

```java
code goes here
```
6. The following Java program compiles and runs. What is its output?

```java
public class ModLoop {
    public static void main(String[] args) {
        int n = 100;
        int z = 2;

        while (n > 1) {
            if((n % z) == 0) {
                System.out.println(z);
                n = n / z;
            } else {
                z = z + 3;
            }
        }
    }
}
```
7. The following Java program compiles and runs. What is its output?  

```
public class LoopWithString {
    public static void main(String[] args) {
        String str = "37fun42Java14";
        int n = -1;
        char c = '8';

        while ( !Character.isLetter(c) ) {
            System.out.println("n=" + n + ", c=" + c);
            n++;
            c = str.charAt(n);
        }

        while ( Character.isLetter(c) ) {
            System.out.println("LETTER n=" + n + ", c=" + c);
            n++;
            c = str.charAt(n);
        }
    }
}
```
8. The following Java program compiles and runs. What is its output? (15)

```java
public class MethodTest {

    public static int foo(int a) {
        int b = a / 10;
        int c = a % 10;

        System.out.println("a=", a + ", b=", b + ", c=", c);

        for(int i = b; i <= c; i++) {
            System.out.println("i=", i);
            if(b == c) return i;
        }

        return c;
    }

    public static void main(String[] args) {
        int a = 14;
        int b = 41;
        int c = 33;

        System.out.println("foo\n" + a + ")=", foo(a));
        System.out.println("foo\n" + b + ")=", foo(b));
        System.out.println("foo\n" + c + ")=", foo(c));
    }
}
```