CSE 11 Final
Winter 2015

Page 1 ___________ (X points)
Page 2 ___________ (X points)
Page 3 ___________ (X points)
Page 4 ___________ (X points)
Page 5 ___________ (X points)
Page 6 ___________ (X points)
Page 7 ___________ (X points)
Page 8 ___________ (X points)
Page 9 ___________ (X points)
Page 10 ___________ (X points)

Total ___________ (X points) (100%)

This exam is to be taken by yourself with closed books, closed notes, no electronic devices. You are allowed both sides of an 8.5"x11" sheet of paper handwritten by you.
1. Which of the following are not valid Java identifiers? (Circle your answer(s).)

- pizza_party
- _pepperoni_
- chee$y
- implements
- Round.Table.
- Private
- 1olive
- fiveToppings

2. Using the operator precedence table above, evaluate each expression and state what gets printed.

```java
int a = 5, b = 6, c = 4, d = 3;
System.out.println ( c <= d || b == a );
System.out.println ( b != c && d > a );
System.out.println ( ! ( b != a ) );
System.out.println( ( ! (c == d && b > a) ) == (d <= c || b == a) );
```

3. What is printed by the following code?

```java
int x = 3;
int y = x;
System.out.println(y == 3);
```

```java
x = 4;
System.out.println(y == 3);
```

4. What values of a and b would result in the following code printing “D”?

```java
if( (a > 0) || (b > 0) ) {
    if( a > b )
        System.out.println("A");
    else
        System.out.println("B");
} else if( (a < 0) || (b < 0) )
    System.out.println("C");
else
    System.out.println("D");
```
5. What is the output produced by the following program?

```java
public class Question5
{
    public static void main(String[] args)
    {
        final int MAX = 3, MIN = 2;
        int i = 4, j = 5;

        for ( i = 1; i < MAX; ++i )
        {
            j = 10 - i;
            while (j > MIN)
            {
                --j;
                System.out.println( i + " " + j );
                j -= 2;
            }
        }
        System.out.println( i + " " + j );
    }
}
```

Output:
```
```

6. What is the output produced by the following program? (Hint: draw stack frames)

```java
public class Question6
{
    public static void main(String[] args)
    {
        mystery( 5 );
    }

    public static int mystery( int x )
    {
        int y = x + 5;
        int z = x + 2;

        if ( y > 4 )
        {
            System.out.println( x + " + " + y + " + " + z );
            z = x + mystery( x - 3 );
            System.out.println( x + " + " + y + " + " + z );
        }
        else
        {
            y = z - x;
            System.out.println( "Stop!" );
            System.out.println( x + " + " + y + " + " + z );
        }

        return y;
    }
}
```

Output:
7. You type `java Driver` at the command line and you get the following:

```java
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: 5
    at Bar.method5(Bar.java:13)
    at Foo.method1(Foo.java:11)
    at Driver.main(Driver.java:7)
```

Is this a compile time or a run time error? ________________________

What is the index that was out of bounds? _____________________

What method in what class in what file and line number in your code did this occur? Assume that you have written the Bar, Foo, and Driver classes.

Method _______________________________

Class _______________________________

File ________________________________

Line # ______________________________

8. Assume a program had the following definitions:

```java
int[] a1 = { 5, 6, 7, 8 };
int[] a2 = a1;
int[] a3 = { 5, 6, 7, 8 };
```

What are the results produced by evaluating the following expressions?

a1 == a2 __________ a1 == a3 __________ a2 == a3 __________

9. What is the default initial value of each array element in the following arrays? Only write answer of a single element of the created array:

```java
int[] i = new int[5]; _______ boolean[] b = new boolean[1]; _______
double[] d = new double[3]; _____ Object[] o = new Object[2]; _______
```

10. True or False:
    a. A class can inherit from multiple superclasses using the `extends` keyword. __________
    b. In order to assign a value of type `int` to a variable of type `double`, you must use a typecast on the `int`. __________
    c. A class that declares an abstract method must be declared an abstract class. _______
    d. A class without an abstract method cannot be declared an abstract class. _______
What gets printed by the following code? _____

```java
int x = 15;
if (x > 11) {
    x += 5;
} else {
    x += 7;
}
System.out.println(x);
```

What gets printed by the following code? _____

```java
int x = 15;
if (x > 7) {
    x += 5;
} else if (x <= 14) {
    x += 7;
}
System.out.println(x);
```

What gets printed by the following code? _____

```java
int x = 15;
if (x < 7) {
    x += 5;
} else if (x >= 14) {
    x += 7;
}
System.out.println(x);
```

What gets printed by the following code? _____

```java
int x = 15;
if (x > 7) {
    x += 5;
} if (x >= 14) {
    x += 7;
}
System.out.println(x);
```

What gets printed by the following code? _____

```java
int x = 15;
if (x < 11) {
    x += 5;
} else {
    x += 7;
}
System.out.println(x);
```

What gets printed by the following code? _____

```java
int x = 15;
if (x > 7) {
    x += 5;
} if (x < 13) {
    x += 7;
}
System.out.println(x);
```
12. Consider the following program:

```java
public class Test12
{
    private static int a;
    private int b;
    private int c = 3;
    public Test12( int b )
    {
        this.b = b;
    }
    public void method1( int x )
    {
        int a = x;
        int c = a;
        a = b;
        System.out.println( "Test12.a = " + Test12.a );
        System.out.println( "this.b = " + this.b );
        System.out.println( "this.c = " + this.c );
        System.out.println( "c = " + c );
        System.out.println( "b = " + b );
        System.out.println( "a = " + a );
    }
    public void method2( int b, int c )
    {
        this.b = b;
        this.c = c;
        c = a+1;
        a = b-1;
        System.out.println( "Test12.a = " + Test12.a );
        System.out.println( "this.b = " + this.b );
        System.out.println( "this.c = " + this.c );
        System.out.println( "c = " + c );
        System.out.println( "b = " + b );
        System.out.println( "a = " + a );
    }
}

public class Driver
{
    public static void main( String[] args )
    {
        Test12 ref = new Test12( 8 );
        ref.method1( 2 );
        ref.method2( 1, 0 );
    }
}
```

Output

Test12.a = ________
this.b = ________
this.c = ________
c = ________
b = ________
a = ________
Test12.a = ________
this.b = ________
this.c = ________
c = ________
b = ________
a = ________
Given the following class definitions and hierarchy:

```java
public class Animal {
    public void method1() {
        System.out.println("Animal 1");
    }
    public void method2() {
        System.out.println("Animal 2");
    }
}
public class Reptile extends Animal {
    public void method1() {
        method2();
        System.out.println("Reptile 1");
    }
    public void method3() {
        System.out.println("Reptile 3");
        super.method1();
    }
}
public class Mammal extends Animal {
    public void method1() {
        System.out.println("Mammal 1");
    }
    public void method3() {
        System.out.println("Mammal 3");
    }
}
public class Cat extends Mammal {
    public void method1() {
        System.out.println("Cat 1");
    }
    public void method2() {
        super.method2();
        System.out.println("Cat 2");
        method1();
    }
}
```

What is the output of the following code:

```
Animal var1;
var1 = new Cat();
var1.method1();
System.out.println("-----");
var1.method2();
System.out.println("-----");
((Cat) var1).method3();
```

What is the output of the following code:

```
Animal var2;
var2 = new Reptile();
var2.method1();
System.out.println("-----");
var2.method2();
System.out.println("-----");
((Reptile) var2).method3();
```
14. Given the following directory structure:

Typing `pwd` into the terminal returns `/home/cse11/hw1`

a) What is the command, using *relative paths*, to change directory into `hw2` _________________
b) What is the command, using *absolute paths*, to change directory into `cpu` _________________
c) What is the command to list all files in the current directory ______________________________
d) You just ran `pwd` and you’re in `/home/cse11/hw2` and you have the files `Question14.java` and `apache.jar`. `Question14.java` makes use of class definitions in `apache.jar`. What is the command to compile `Question14.java`? _________________
e) What is the command to run the Java program created from (d) _________________

15. Given the following code:

```java
import java.util.Scanner;
public class DogYears {
    public static void main(String[] args) {
        Scanner scnr = new Scanner(System.in);
        int dogAgeYears = 0;
        System.out.print("Enter dog's age (in years): ");
        dogAgeYears = scnr.nextInt();
        switch (dogAgeYears) {
            case 0:
                System.out.println("0..14 human years.");
            case 1:
                System.out.println("15 human years.");
                break;
            case 2:
                System.out.println("24 human years.");
                break;
            default:
                System.out.println("Unknown");
            return;
        }
    }
}
```

a) What gets printed when the user enters 0?

b) What gets printed when the user enters 3?
16. What is the output of the following code:

```java
public class Question16 {
    public static void main(String[] args) {
        int[] array = {3, 2, 1};
        method1(array, array[2]);
        System.out.println(array[0]);
        System.out.println(array[1]);
        System.out.println(array[2]);
    }
    public static void method1(int[] a, int i) {
        a[0] = 1;
        i = 3;
        return;
    }
}
```

Output

```
8 16.
```

17. Determine the output of the following code segments. If there is a runtime or compiler error, write that instead of the output.

```java
int i, j;
int [][] array = { {1, 3, 5}, {2, 4, 6, 8} };
for ( i = 0; i < array.length; i++)
{
    for(j = 0; j < array[i].length; j++)
    {
        System.out.println( array[i][j] );
    }
}
```

Output

```
Output
```

```java
int i, j;
int [][] array = { {1, 3, 5}, {2, 4, 6, 8} };
for ( i = array.length; i >= 0; i-- )
{
    for(j = 0; j <= array[i].length; j++)
    {
        System.out.println( array[i][j] );
    }
}
```

Output

```
Output
```

18. Give a brief explanation of why Java makes use of buffers for file I/O:
19. Given the following code:

```java
import java.util.Scanner;

public class DogYears {
    final static int AGE_FACTOR = 7;
    public static void main(String[] args) {
        Scanner scnr = new Scanner(System.in);
        String name = "Scruffy";
        int dogAgeYears = 0;
        double result = 0;
        System.out.print("Enter dog's age (in years): ");
        dogAgeYears = scnr.nextInt();
        result = dogAgeYears * AGE_FACTOR;
        System.out.println(result);
    }
}
```

In which part of memory are the contents of the following variables stored (static, stack, or heap)

a) AGE_FACTOR
b) scnr
c) name
d) dogAgeYears
e) result

20. What is the output from the following code:

```java
public class Question20 {
    public static void main(String[] args) {
        Chalk c1 = new Chalk("white");
        Chalk c2 = new Chalk("green");
        Chalk c3 = c1;
        c1.write("final");
        c2.write("test");
        c3.write("Q20");
    }
}
```

```java
public class Chalk {
    private static int numPieces = 0;
    private String color;
    public Chalk(String color) {
        this.numPieces++;
        this.color = color;
    }
    public static int getNumPieces() {
        return numPieces;
    }
    public void write(String word) {
        System.out.println(numPieces + "/" + color + " "+ word);
    }
}
```

Output

```java
final test Q20
```
21. Write a Java class Question21.java that implements Q21.java. The method runMe(String) should print “hello world” to the terminal:

```java
Q21.java
public interface Q21 {
    public void runMe(String s);
}
```

```java
Driver.java
public class Driver {
    public static void main(String[] args) {
        Question21 q = new Question21();
        q.runMe("");
    }
}
```

```java
Question21.java
```

22. True/False
   a) Run Time Exceptions require try/catch statements in order to get the code to compile _________
   b) GUIs need to use a Layout Manager in order to view multiple elements in a frame _____________
   c) When performing file I/O, you must have a try/catch (IOException) or throws IOException in your code ______________
   d) If you add an element to the end of an ArrayList, you’ll get an ArrayIndexOutOfBoundsException_______
   e) All classes inherit methods from the Object class ____________
23. Write an abstract class Question23.java that has the following fields/methods:
   - Protected fields: String name, int grade
   - Public field: char letterGrade
   - Public method: void setGrade(int grade)
   - Public abstract method: String getName()

24. List a job title that you found on LinkedIn that’s of interest to you:

25. Name 3 of your classmates:
   a.
   b.
   c.
Scratch Paper