CSE 8B
Practice Final
Fall 2015

You’re allowed one page (front and back) of hand written notes to use during the final. Bring your student ID. Final is on Monday, 7-10pm in CNTR 105.
1) What is output of the following logic

```java
int i = 3;
while (i <= 8) {
    if (i % 2 == 0 && i != 7) {
        i += 3;
    } else {
        i--;
    }
    System.out.println("i = " + i);
}
```

2) Which of the following are valid Java identifiers?

$ocks!  CSE-8B  777sevens777  0xFFFF  
CSE_8B  Int    JavaClass  new

3) What gets printed by this code?

```java
public class FinalExam{
    public static void main(String[] args){
        int[] array = { 35, 85, 55, 115, 155, 95, 35, 155, 45 };  
        int x = 73, y = 0;
        for (int i = 0; i < array.length; i++) {
            int n = array[i];
            if (n < x) {
                x = n;
                y = i;
            }
        }
        System.out.println(x + ", " + y);
    }
}
```

What is printed if the line `if (n < x)` was changed to `if (n <= x)`?

What is printed if the line `if (n < x)` was changed to `if (n >= x)`?

What is printed if the line `if (n < x)` was changed to `if (n > x)`?

What is printed if the line `if (n < x)` was changed to `if (n == x)`?

What is printed if the line `if (n < x)` was changed to `if (n != x)`?
4) What gets printed:

```java
recurse(5);
public void recurse(int x) {
    if (x<0)
        System.out.println("complete");
    else {
        System.out.println(x);
        recurse(x-1);
    }
}
```

```java
recurse(0);
public void recurse(int x) {
    if (x < 5)
        System.out.println("complete");
    else {
        System.out.println(x);
        recurse(x+1);
    }
}
```

```java
recurse(5);
public void recurse(int x) {
    if (x<=0)
        System.out.println("complete");
    else {
        System.out.println(x);
        recurse(x-1);
        System.out.println(x);
    }
}
```

```java
recurse(5, 2);
public void recurse(int x, int y) {
    if (x <= 0)
        System.out.println("complete");
    else {
        System.out.println(x-y);
        if (y%2 == 0)
            y = 1;
        else
            y = 2;
        recurse(x-1, y);
    }
}
```
5) Which of the following situations would multithreading be useful?
Displaying text to the terminal in a specific order
Calculating a sequence of values, each of which require the previous result
Adding an array of integers together
Animating multiple objects

6) Given that MyThread extends Thread how would you start executing the thread:
Thread t1 = new MyThread();

7) Circle the properties that are true for the following:

**Abstract Classes** -
A) Can have constructors
B) Does not always have abstract methods
C) An instance of an abstract class may be created
D) Inherited by using extends keyword
E) Fields must be constants (i.e. public, static, final)
F) A class can inherit multiple abstract classes

**Interfaces** -
A) Can have constructors
B) All methods must be abstract
C) An instance of an interface may be created
D) Inherited by using implements keyword
E) Fields must be constants (i.e. public, static, final)
F) A class can inherit multiple interfaces
8) Given the following definitions:

```java
public interface Animal {
    public abstract String speak(String str);
}

class Cat implements Animal {
    private String speak;
    public Cat() {
        this.speak = "meow";
    }
    public String speak(String str) {
        return str + ": " + this.speak;
    }
    public String speak() {
        return this.speak("Cat");
    }
}

class Dog implements Animal {
    private String speak;
    public Dog() {
        this.speak = "woof";
    }
    public String speak(String str) {
        return str + ": " + this.speak;
    }
    public String speak(boolean pb) {
        if (pb) {
            return this.speak("Peanut");
        } else {
            return this.speak("Butter");
        }
    }
}
And the following variable definitions:
Cat cat = new Cat();
Dog dog = new Dog();
Animal animal;

What gets printed with the following statements (each statement is executed in the order it appears). If there is a compile time error, write "Error" and assume that line is commented out when run.
System.out.println(cat.speak());
System.out.println(cat.speak(true));
System.out.println(cat.speak("Cocoa"));
System.out.println(dog.speak());
System.out.println(dog.speak(true));
System.out.println(dog.speak("Boba"));
animal = cat;
System.out.println(animal.speak());
System.out.println(animal.speak(true));
System.out.println(animal.speak("Cocoa"));
animal = new Dog2();
System.out.println(animal.speak());
System.out.println(animal.speak(true));
System.out.println(animal.speak("Boba"));

9) List the Big O complexity

```java
for (int i = 0; i < n; i++) {
    for (int j = 0; j < 10000; j++) {
        for (int k = 0; k < n/2; k++) {
            System.out.println(i+j+k);
        }
    }
}
```

```java
int index = n/2;
while (index != 0) {
    index = index/2;
}
```

```java
for (int i = 0; i < n; i+=2) {
    for (int j = i; j < n/2; j+=2) {
        System.out.println(i+j);
    }
}
```

```java
for (int i = n; i > 0; i--) {
    for (int j = Integer.MAX_VALUE; j > i; j--) {
        System.out.println(i+j);
    }
}
```

```java
for (int i = n; i > n-100; i--) {
    for (int j = 0; j<(n-n/2); j++) {
        System.out.println(i+j);
    }
}
```

```java
for (int i = n; i < (n+100); i++) {
    for (int j = n; j > (n-100); j--) {
        System.out.println(i+j);
    }
}
10) Given the following path:
/home/jundt/cse8b/grades/final/cs8bxx.txt
And that the home directory is /home/jundt, answer the following questions.

What command shows the current working directory?

Assume the command returns /home/jundt/cse8b/grades. How do you open cs8bxx.txt without changing the directory? Use the text editor of your choice.

You change your final grade in the text file to 100%. How do you save and close the text editor that you opened the file with? For vim users, assume that you are still in “insert” mode.

Still in /home/jundt/cse8b/grades, you type a thank you note to Professor Jundt. How do you verify the text file was successfully created? More specifically, what command do you use to show the contents of the current directory?

To be sure Professor Jundt sees the file, you decide to put it in the /home/jundt/cse8b directory. How do you change your current working directory to /home/jundt/cse8b?

How do you copy the thank you note from /home/jundt/cse8b/grades to the current directory, /home/jundt/cse8b? The note is named thankyou.txt.

Upon second thought, you decide to remove the original thankyou.txt from /home/jundt/cse8b/grades. What command would you use to accomplish this?

You realize that /home/jundt would be a better directory to put the thank you note in. How do you move thankyou.txt there? Remember that you are currently in /home/jundt/cse8b.

11) Write what gets printed.

```java
int[] array = {0, 1, 2};
doStuff(array);
System.out.println(array[0]);
System.out.println(array[1]);
System.out.println(array[2]);

public void doStuff(int[] arr) {
    arr[0] = arr.length;
    int x = arr[2];
    x++;
    arr[1] = x;
}
```
12) List in order the methods that run.

```java
try {
    method1();
    method2();  // causes an ArrayIndexOutOfBoundsException
    method3();
} catch (Exception e) {
    method4();
    method5();
} method6();
```

```java
try {
    method1();  // causes a NullPointerException
    method2();
} catch (Exception e) {
    method3();
    method4();
} finally {
    method5();
} method6();
```

```java
try {
    method1();
    method2();
    method3();  // causes an ArithmeticException
} catch (Exception e) {
    method4();
    return;
} finally {
    method5();
} method6();
```

13) List the best data structure for the given situation.

array  ArrayList  HashSet  HashMap

- Storing a phone number along with a name.
- Storing an unknown number of things in order
- Storing words in a dictionary, so you can efficiently check them later on.
- Storing items that you will have to iterate through.
- Storing something without importing anything.
- Storing exactly 100 numbers, so you can sort them later.
14) Sort the following based on where the content of the variable is stored. Remember the difference between a pointer that references that content versus the actual content itself.

String    int    char    int[]    Scanner    float    String[]

15) Which method would be used here in order to pass these tests? (Assume the latest version of JUnit is in the build path).

```java
@Test
public void test1() {
    Integer i1 = 10;
    Integer i2 = 90;
    ____((i1 + i2, new Integer(100));
}

@Test
public void test2() {
    String s1 = "CSE8B";
    String s2 = new String("CSE8B");
    ____((s1, s2);
}
```

In test-driven development, unit-tests should be written after the code. (TRUE / FALSE)
After all of the unit tests pass, the program is fully functional and ready to ship. (TRUE / FALSE)
Unit tests are designed to test a single entity of the program (a class or method). (TRUE / FALSE)

16) Draw the UML for the following:

```java
public class FinalExam {
    private String name;
    private int grade;
    private boolean crying;
    public FinalExam() {...}
    public static boolean setGrade(int grade) {...}
    public void beginCrying() {...}
}

public abstract class Student {
    public static String university;
    public abstract String getName() {...}
}

public class You extends Student {
    public int age;
    public You() {...}
    public boolean setAge(int age) {...}
}
17) What gets printed by this code?

```java
class ClassA {
    public void method1() {
        method3();
        System.out.println("ClassA 1");
    }
    public void method3() {
        System.out.println("ClassA 3");
    }
}
class ClassB extends ClassA {
    public void method1() {
        super.method3();
        System.out.println("ClassB 1");
    }
    public void method2() {
        method1();
        System.out.println("ClassB 2");
    }
}
class ClassC extends ClassA {
    public void method1() {
        super.method3();
        System.out.println("ClassC 1");
    }
    public void method3() {
        System.out.println("ClassC 3");
    }
}
class ClassD extends ClassB {
    public void method2() {
        super.method2();
        System.out.println("ClassD 2");
    }
    public void method3() {
        super.method1();
        System.out.println("ClassD 3");
    }
}

public class Test1 {
    public static void main(String[] args) {
        ClassA ref1;
        ref1 = new ClassD();
        (ClassB) ref1).method1();
        System.out.println("------");
        ref1.method3();
        System.out.println("------");
        (ClassD)ref1).method2();
    }
}

public class Test2 {
    public static void main(String[] args) {
        ClassA ref1;
        ref1 = new ClassC();
        ref1.method1();
        System.out.println("------");
        (ClassC) ref1).method2();
        System.out.println("------");
        ref1.method3();
    }
}
```
18) Given the following Java classes, select which would be best to use in the following situations:

<table>
<thead>
<tr>
<th>System (in/out)</th>
<th>BufferedInputStream</th>
<th>BufferedOutputStream</th>
<th>Scanner</th>
<th>PrintWriter</th>
</tr>
</thead>
</table>

1. Reading text from a file __________
2. Writing to a file byte-by-byte __________
3. Reading to a file byte-to-byte __________
4. Writing text to the terminal __________

19) Fill in each blank with one of the following key words: Exception, compiler error, package, GUI, IDE, UML, constant, interface, abstract class, polymorphism, text editor

- If an error occurs before runtime, it is considered a(n) ________, but if it occurs during runtime, it is a(n) ________.
- An interface that is more than just plain text (buttons, canvas, text boxes, etc.) is a(n) __________.
- VI and emacs are examples of a dedicated __________.
- Eclipse and IntelliJ are examples of a(n) __________.
- A(n) __________ is usually declared as both static and final.
- The implements keyword is associated with __________(s), while the extends keyword is associated with __________(s).