Topics for CSC 205 Quiz #2 **Friday, October 14th**

Quiz #2 will cover Labs #5, #6, and #7. Be sure you can write all code from Lab #5 and Lab #6. The following topics are especially important to review. Bring your class portfolio with you to the quiz & make sure it is organized.

- Be able to name and define the three types of relationships that can exist between objects. How do you add inheritance or containment to a class?
- Definition of base class and derived class. Be able to draw an inheritance hierarchy diagram. What are the properties of the `Object` superclass, and what methods are defined in it? superclass of all classes, provides starting point
- Distinction between overriding and overloading. Be able to set up the constructor for a derived class and use the `super` keyword.
- Differences between `private`, `protected`, `public`, and no access
- Definition of polymorphism. When does a `ClassCastException` occur? What types of polymorphism errors are caught by the compiler?
- Differences between `abstract` and `final` classes.
- Be able to declare a `BitSet` object and use the `set`, `clear`, and `get` methods; How would you print out a `BitSet`?; Why are `BitSets` used?

datatype left doesn't match datatype right

Computer Science 205 Quiz #2

25/50

Friday, October 14th, 2016

50 points

Name : Yu-Ching

1. Determine what type of object-oriented relationship you would use between the following ADTs. (1 point each)

   (a) Computers and CPUs Containment ✓

   (b) Professors and Employees Inheritance

-4

2. **Fill in the Blank.** (2 points each)

   (a) A(n) ? class can never be extended.

   final

   (b) A(n) ? class can never be instantiated. Its only purpose is for other classes to extend.

   abstract

   (c) A(n) ? class is a class nested inside another class.

   inner

   (d) ~~Two or more methods with the same name in the same class scope is an example of ?.~~

   ~~overwriting~~ ~~overwriting~~ overwriting overloading

   (e) ~~A(n) ? is a built-in Java data type that represents a purely abstract class.~~

   ~~private Date date;~~ interface

3. **True or False.** (1 point each)

   (a) A derived class has access to all `protected` methods and attributes of its base class.

   True

   (b) You can have multiple classes or interfaces defined inside of one Java source file. However, only one of them can be `public`.

   -1

   True

   (c) Java does not allow multiple inheritance. That is, a class is not allowed to extend more than one class.

   True

   (d) The expression *object* `instanceof` *class* has the value `true` only if *object* is an instance of *class* or its subclasses..

   false

   (e) Some of the methods of an `abstract` class can be defined as `abstract` methods.

   True

   (f) An `abstract` class cannot have constructors.

   false

4. (a) Name the three methods defined in the `Object` class. (2 points)

-2 Shape, weight, color

(b) Suppose we have two `Date` objects, `thisSaturday` and `oktoberfest` defined as follows.

```
Date thisSaturday = new Date(2016, 10, 15);
Date oktoberfest = new Date(2016, 10, 15);
```

-2 Explain why the boolean expression below produces a *false*. (2 points)

`thisSaturday == oktoberfest` Since both thisSaturday and oktoberfest are new Dates, they cannot equal to each other

Use the reference sheet provided with this quiz to answer this next question.

5. (a) Name a derived class. (2 points)

-2 birthDate

(b) Give an example of *overriding* that is shown on your reference sheet. (2 points)

public String toString()

(c) Write an explicit constructor for the `Employee` class. You should have a total of five parameters. (6 points)

-6

```
public class TestEmployee {
    public static void (String args[]) {
        String employee01 = ("Ho", "Yu-Ching", 50000, new Date(1996,02,26), new Date(2016,10,14
        System.out.println(employee01);
    }
}
```

6. Assume that `Y` and `Z` are subclasses of `X`, and we have the following lines of code.

```
X x = new X();
Y y = new Y();
Z z = new Z();
x = z;          // polymorphism occurs
```

Determine whether each of the following statements is valid or invalid. Valid is defined as producing no errors at compile-time or run-time. If invalid, explain why. (2 points each)

(a) `z = x;` Invalid

-2 (b) `z = (X) x;` Invalid

(c) `y = (Y) x;` Valid

(d) `z = (Z) x;` Valid

7. What would be the output of the following code segment? (2 points)

```
String input = "grizzly<bears>brown<bears>2<bears>1833.0<bears>";
Scanner sc = new Scanner(input).useDelimiter("<bears>");

System.out.println(sc.next());
System.out.println(sc.next());
System.out.println(sc.nextInt());
System.out.println(sc.nextDouble());
```

grizzly
brown
2
1833.0

8. Write a value-returning class method `inverse` that takes a `BitSet` object and returns its inverse. The inverse is merely the "flipping of all set bits to 0, and the turning on of all unset bits. For example, the inverse of 11111110 is 00000001. You must use the instance methods `get` and `clear` in your solution. (6 points)

-6

```
BitSet objectNumber = new BitSet(8);
```

CSC 205 Quiz #2 Reference Sheet

The Person Class

```
public class Person {
  private String lastName;
  private String firstName;
  private Date birthDate;

  public Person() {
    this.lastName = "N/A";
    this.firstName = "N/A";
    birthDate = null;
  }

  public Person(String lastName, String firstName, Date birthDate) {
    this.lastName = lastName;
    this.firstName = firstName;
    this.birthDate = birthDate;
  }

  public String getLastName() {
    return lastName;
  }

  public String getFirstName() {
    return firstName;
 }

  public Date getBirthDate() {
    return birthDate;
  }
}
```

The Employee Class

```
public class Employee extends Person {
  private double salary;
  private Date employmentDate;



  public String toString() {
        return ("name = " + getLastName() + ", " + getFirstName()
                  + "\n" + "salary = " + salary + "\n" +
                "birth = " + getBirthDate() + "\n" +
                "hired = " + employmentDate);
  }
}
```