**CSC 133 - REVIEW QUESTIONS FOR FINAL EXAM**
**Dr. Muyan**

Multiple Choice. Write the letter of the **best** answer in the blank to the left.

_____ When we say a certain concrete Java/CN1 class "X" implements a certain interface "Y" (assuming we use a version before Java 8), we mean that

A. X inherits certain fields and methods from Y
B. X provides implementations of the methods listed in Y
C. Y is the super-class of X
D. X "has-a" Y
E. none of the above

_____ Which of the following is ***not*** a word that can appear in front of an instance variable or method in a Java/CN1 class as a "visibility (access) modifier"?

A. public
B. protected
C. default
D. private
E. more than one of the above (if you choose this, list correct letters here:_____)
F. none of the above; A through D are all valid Java visibility modifier keywords

_____ The term "*has-a*" is most closely related to the Object Oriented notion of

A. abstraction
B. encapsulation
C. aggregation
D. inheritance
E. polymorphism

_____ *Polymorphism* refers to the facility in a language to

A. derive classes from other classes
B. hide internal data and/or operations inside an object
C. create a class which derives from multiple parent classes
D. invoke the same operation in a variety of different objects regardless of their type
E. automatically invoke a named operation in a parent class if it is not found in the subclass
F. hide an operation in a parent class by providing a method of the same name in a subclass

_____ "Encapsulation" is best described as support for

A. bundling and information hiding
B. inheritance and polymorphism
C. design patterns
D. private variables
E. none of the above

_____ A certain program contains the following code (assume the "…" represents valid code):

```
public class Fish {
  public void setWeight (double w) { . . . }
}

public interface Catchable {
  public void catch(int hookSize);
}

public class Trout extends Fish implements Catchable {
  public void setWeight (double x) { . . . }
  public void catch(int hookSize) { ... }
}
```

The main program instantiates a **`Trout`**, assigns it to a variable of type **`Fish`**, and by casting this variable to **`Catchable`** the program passes it to a method with the signature **`display(Catchable c)`**. The **`display()`** method contains the statement "**`c.setWeight(5.0);`**". Which of the following correctly describes what happens in this program?

A. it fails to compile because of the assignment of **`Trout`** to **`Fish`**
B. it fails to compile because of the statement "**`c.setWeight(5.0)`**"
C. it fails to compile because of the mismatched parameter names "x" and "w"
D. it generates a runtime exception when **`Fish`** is casted to **`Catchable`**
E. it generates a runtime exception when **`display()`** attempts to execute "**`c.setWeight(5.0)`**"
F. it invokes the **`setWeight()`** method in **`Fish`**
G. it invokes the **`setWeight()`** method in **`Trout`**

_____ Detecting that one graphical screen object collides with another would most likely involve

A. checking whether the (x,y) locations of the two objects are the same
B. using a *contains()* method which determines if the given point is inside the object
C. comparing the distance between the (x,y) locations of the two objects with the radii of their "bounding circles"
D. more than one of the above (if you choose this, list correct letters here:_____)
E. none of the above

_____ In order to add animation to a CN1 project:

A. We create an object of built-in class **`UITimer`** and invoke **`start()`** on it
B. We create an object of built-in class **`Timer`** and invoke **`start()`** on it
C. We create an object of built-in class **`UITimer`** and first invoke **`schedule()`** and then invoke **start()** on it
D. We create an object of built-in class **`Timer`** and invoke **`schedule()`** on it
E. We create an object of built-in class **`UITimer`** and invoke **`schedule()`** on it

_____ In CN1, to play sounds we make use of the following built-in class:

A. AudioClip
B. Media
C. MediaPlayer
D. InputStream
E. Sound
F. more than one of the above (if you choose this, list correct letters here:_____)

_____ The main reason for using homogeneous representation for points in graphics systems is

A. it converts a 2D point into a 3D point
B. it allows the use of a single matrix operation to perform multiple transformations
C. it allows use of both affine and non-affine transformations
D. affine transformations require homogeneous representation of points
E. none of the above

_____ Which of the following transformation matrices indicates a scaling by (A, B), where A and B indicates the scaling factors along the x- and y-axis, respectively? Assume that we use **column-major** format.

A. $\begin{bmatrix} A & 0 & 0 \\ 0 & B & 0 \\ 0 & 0 & 1 \end{bmatrix}$ B. $\begin{bmatrix} B & 0 & 0 \\ 0 & A & 0 \\ 0 & 0 & 1 \end{bmatrix}$ C. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ A & B & 1 \end{bmatrix}$ D. $\begin{bmatrix} 1 & 0 & A \\ 0 & 1 & B \\ 0 & 0 & 1 \end{bmatrix}$

E. none of the above

_____ In CN1, consider a simple triangle defined in its local coordinate system as shown in Figure.A. Following Local Transformations (LTs) are defined for this triangle: rotation with 90 degrees and translation with 10 units along both axes. After its LTs are applied to the triangle, it appears in the world coordinate system as shown in Figure.B. Which of the followings is true?

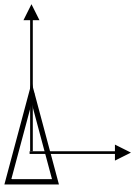

Figure.A

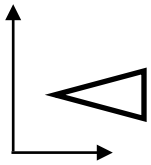

Figure.B

A. in the code of the **`draw()`** method of the triangle, first rotation LT and then translation LT is applied to the transform object of the graphics object
B. in the code of the **`draw()`** method of the triangle, first translation LT and then rotation LT is applied to the transform object of the graphics object
C. drawing coordinates of the triangle first goes through translation LT and then rotation LT
D. more than one of the above
E. none one of the above

_____ A certain CN1 program contains a class which extends **`Container`**. The class contains the following CN1 statements in its **`paint (Graphics g)`** method:

```
g.getTransform(gXfrom);
…
gXform.translate (0, this.getHeight());
gXform.scale(1,-1);
…
```

The most likely reason the program contains these statements is

A. to convert window coordinates to normalized device coordinates
B. to convert normalized device coordinates to display coordinates
C. to apply display-mapping transform
D. to apply the Viewing Transformation Matrix (VTM)
E. to account for hierarchical object transformations

_____ The purpose of the "straightness" function in a recursive Bezier curve subdivision algorithm is

A. to avoid the occurrence of discontinuities in the curve
B. to determine whether to continue the recursion
C. to generate intervals of equal parametric value
D. to control the degree of the polynomial describing the curve
E. none of the above

For each of the following situations, write in the blank to the left the number of a design pattern which could be used to provide an appropriate implementation solution.

Use the following numbers to identify the design patterns:

| **Design Pattern** | iterator | composite | singleton | observer | command | strategy | proxy | factory |
|---|---|---|---|---|---|---|---|---|
| **Number** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

_____ A GUI framework requires a “container” component that is a displayable object which can hold other displayable objects.

_____ A program should not be allowed to create multiple AudioPlayer objects.

_____ A game has several different instances of a class named Robot. Each Robot has a behavior associated with it, and the behavior of a particular Robot may change as the game progresses.

_____ A program uses a Vector to store a collection of objects, but the programmer wants to make sure that any subsequent decision to replace the use of Vector with some other data structure will not break any existing clients which use the collection.

_____ A program contains a server module which keeps track of the value of certain stock market commodities. Whenever the price of a stock changes the program posts new price information on a web page. The programmer wants to organize the program so that it will be easy to add other price information views later such as mobile apps, SMS (text) messages, etc.