SE1021 Exam 2   Name:

You may have an 8.5x11 note sheet for this exam. No calculators or other study aids on this exam. Write your initials at the tops of the following pages and read through the exam before you get started.
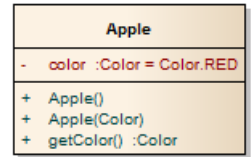
Throughout the exam, write **_concisely_** and **_underline_** key words or phrases.

Have fun!

Name:_____

1. (5 points) In your own words, *describe* what an instance is.

2. (5 points) Consider the Apple class in the UML diagram on the right. *Write* a couple lines of code to call the instance method getColor() from **outside** of the Apple class. Declare all variables that you use.

3. (5 points) *Write* two differences between an abstract class and an interface.

4. (5 points) *Name* two Java classes/interfaces – one whose instances are "event sources", and one whose instances are "event listeners."

5. (5 points) Java Swing provides a framework for responding to user actions. When a button is pressed, some of your code should be run. *Describe* how the framework determines what code to run.

_____

(I don't expect you to need the space below this line.)

6. Consider the program below

```
try {
    Scanner in = new Scanner(System.in);
    System.out.print("Enter the number of pixels in the image: ");
    int size = in.nextInt();
    System.out.print("Enter the number of pixels in a row: ");
    int width = in.nextInt();
    int height = size/width;
    System.out.println("h: "+height);
} catch (InputMismatchException e) {
    System.out.println("ime");
} finally {
    System.out.println("f");
}
System.out.println("done");
```

If something other than a number is entered, in.nextInt() throws an InputMismatchException.

Omitting the prompts to the user and exception stack traces, *write* what will be printed if....
   a. (5 points) The user enters 100 and 10

   b. (5 points) The user enters 100 and 0

   c. (5 points) The user enters 100 and qwert

7. (5 points) *Describe* the difference between an Error and an Exception

8. (5 points) *Describe* the difference between an Exception and a RuntimeException

9. (17 points – 2 points for each multiple choice, 1 point for the true/false.)
   Consider the UML diagram for the program below. This program is similar to the one on Exam 1, but there are several key differences.
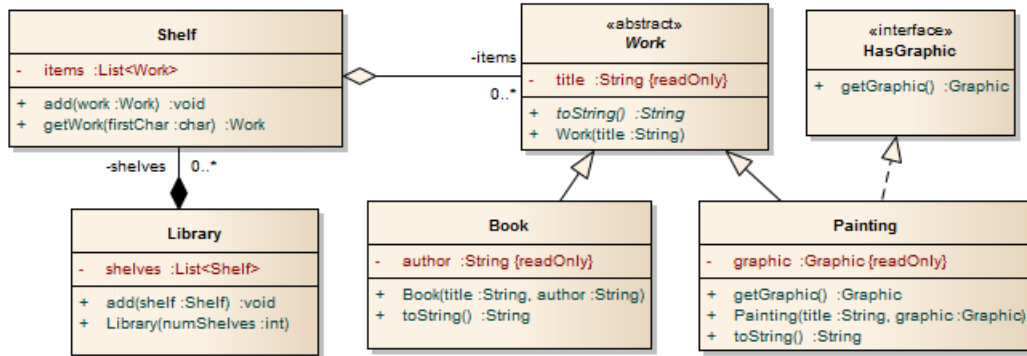
a. **Select** one. The relationship between Work and Book is
   - i. Composition
   - ii. Aggregation
   - iii. Inner-class
   - iv. Inheritance
   - v. Implementation

b. **Select** one. The relationship between Library and Shelf is
   - i. Composition
   - ii. Aggregation
   - iii. Inner-class
   - iv. Inheritance
   - v. Implementation

c. **Select** one. The relationship between HasGraphic and Painting is
   - i. Composition
   - ii. Aggregation
   - iii. Inner-class
   - iv. Inheritance
   - v. Implementation

d. **Select** one. As indicated on the diagram, the *toString* method of Work is…
   - i. abstract
   - ii. volatile
   - iii. void
   - iv. static
   - v. final

e. **Select** one. As indicated on the diagram, the *title* variable of Work is…
   - i. abstract
   - ii. volatile
   - iii. void
   - iv. static
   - v. final

(continued from previous page – see figure there)

f. **Select** one. Which of the following statements is valid?
    i.   Book b = new Book();
    ii. Work w = new Book("John Hancock","Declaration of Independence");
    iii. Book b = new Work();
    iv. Work w = new Work("My Masterpiece");

g. **Select** one. Which of the following statements is valid if `lib` is a Library?
    i.   lib.add(new Book());
    ii. lib.add(new Shelf("Top shelf"));
    iii. lib.add(new Book("Dean & Dean","Java"));
    iv. lib.add(new Shelf());

h. **Circle** one: true / false: A shelf can contain more than one book.

i. **Select** one. (Unrelated to the diagram on the previous page.) Which layout manager would be best for designing this layout:

Each	button	follows
the	one	right	before
it	.
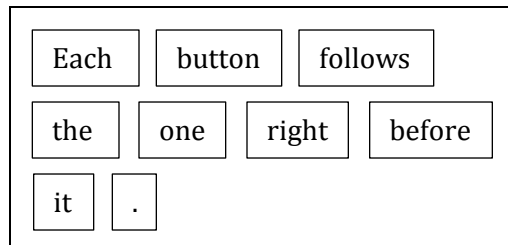
    i.   FlowLayout
    ii. BorderLayout
    iii. BoxLayout
    iv. GridLayout

10. (8 points) Considering the UML diagram from Problem 5, write the entire add method for the Library.

11. (5 points) Consider this code-snippet.
```
public class Gui extends JFrame {
    private String title;
    …
    public JFrame() {
        …
        JButton b = new Button("Press me");
        b.addActionListener(e->System.out.println(title));
    }
}
```
Write whether or not it is legal for the lambda expression above to access the instance variable `title`, and *explain* your answer.

12. (10 points) *Write* an anonymous inner class implementing the ActionListener interface. This interface contains one method: `void actionPerformed(ActionEvent e);`. Your action listener should set the text of the variable `textLabel` to `"hi"` when it is called. *Assign* the variable `a` to point to an instance of your anonymous inner class.

13. (5 points) Consider an ActionListener that listens to multiple buttons. *Describe* one technique the action listener could use to determine which button was clicked.

14. (5 points) Suppose you call a method that throws a FileNotFoundException, a checked exception. *Describe* the consequences of not catching this exception with a try-catch block.