

Show all of your work clearly in the space provided or on the additional page at the end of the exam. If the additional page is used, clearly identify to which exam question it is related. Be sure to **read each problem carefully**. Note that the exam is double sided.

1. (15 points) True/False (**T** or **F**)

- _____ A variable that is declared within a method declaration is a *local variable*.
- _____ Local variables declared in a constructor are accessible from all other methods in the class.
- _____ Local variables declared in a constructor only are accessible from other constructors in the class.
- _____ In order to add a method to a class that has the same name as an already existing method, the number of arguments passed to the new method must be different than the number of arguments passed to the existing method.
- _____ A constructor may call another constructor.
- _____ A `private` attribute is accessible to all methods defined within the class.
- _____ A `static` attribute can only be assigned a value once.
- _____ The Java Virtual Machine has a garbage collector that looks for incorrect values in the program that is running.
- _____ Declaring an attribute as a `singleton` indicates that only a single instance exists for all objects from the class.

2. (10 points) Assign the format string an appropriate value so that the code below produces the following result:

```
12345678901234
   3.1416 0001
  700.6411 0301
```

```
String format = -----
System.out.println("12345678901234");
System.out.printf(format, Math.PI, 1);
System.out.printf(format, 700.641111, 301);
```

3. (20 points) Complete the program below so that the following is true:

- If the user selects cancel (then `null` is returned from the call to `showInputDialog()`), then the program terminates immediately.
- If the user does not enter anything or enters a negative integer, the program displays an error message and repeats the input prompt.
- If the user enters a non-negative integer, the program must display “Your age is: ” followed by the age entered by the user. E.g., “Your age is: 18”.
- Your program is allowed to crash if the user enters a non-integer value.

```
public static void main(String [] args) {  
    int age = -1;  
    String input = null;
```

```
    input = JOptionPane.showInputDialog("Enter your age");
```

4. A handout contains documentation for a class. Carefully study the documentation and answer the following questions:

(a) (15 points) Draw the complete UML class diagram for the class described in the appendix.

(b) (10 points) Implement the constructor for the class.



(c) (10 points) Implement the `getPerimeter` method.

(d) (20 points) Implement the `swap` method.