

[**May use one 8.5 × 11 inch sheet of paper for notes.**] 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) Precisely explain what the following line of Java code does. Draw a picture that shows what happens in memory as a result of this line of code.

```
WinPlotter plotter;
```

2. (15 points) Precisely explain what the following line of Java code does. Draw a picture that shows what happens in memory as a result of this line of code.

```
String word = "Relax";
```

3. (20 points) Given

```
String text = "Why do fools fall in love?\nTo reproduce and outnumber us.";
```

Determine the result of each of the following expressions:

(a) `text.substring(0, 4);`

(b) `text.length();`

(c) `text.indexOf('o');`

(d) `text.substring(5, 6) + text.substring(text.length()-3, text.length());`



4. (25 points) Write a program that asks the user to enter his/her first and last name. Your program should make use of the `nextLine()` method on a `Scanner` object attached to the `System.in` object. The program should display then display the name entered with the last name first. The following is an example of what your program should produce:

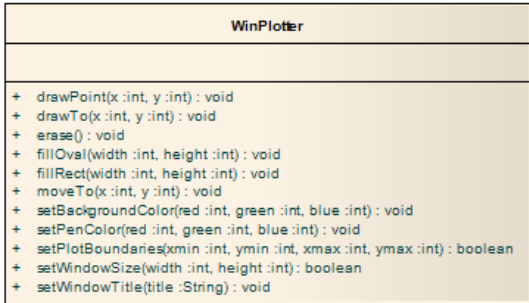
```
Please enter your first and last name: Chris Taylor
Your name is: Taylor, Chris
```

Hint: You may find the `String.indexOf` method useful. The method accepts a character or string and returns the index of the first occurrence in the string on which the method is called.

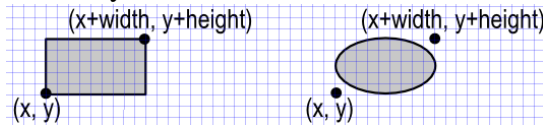
5. (25 points) Suppose that the WinPlotter class has been enhanced with two additional methods:

- fillRect — takes width and height as arguments.
- fillOval — takes width and height as arguments.

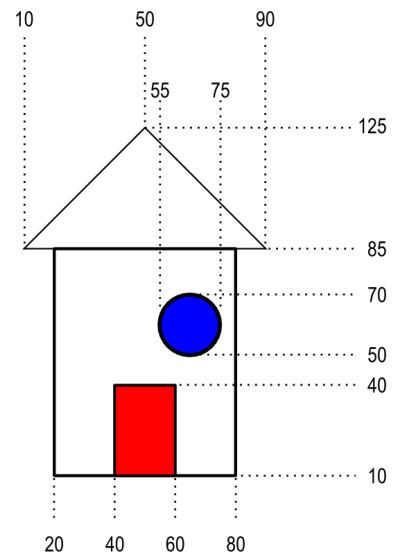
UML Class Diagram:



Assuming that the current location is (x, y) , the dimensions for the rectangle and oval drawn by the above methods are as follows:



Write a program that creates a WinPlotter object and uses it to create the following picture (the filled rectangle should be red and the circle should be blue):





Additional space for your answer to question 5.



Additional space — identify which problem your work is associated with.