



## CS 101 - Problem Solving and Structured Programming Sample Midterm Questions

In addition to the questions here, you will probably find it helpful to look at the non-programming questions in the textbook.

1. Declare variables to hold the following information:
  - a. An instance variable to hold the number of students in a class

```
private int numStudents;
```

- b. A local variable to hold your age

```
int age;
```

- c. A local variable to hold a rectangle that has a solid color

```
FilledRect rectangle;
```

- d. An instance variable to hold your GPA

```
private double gpa;
```

- e. An instance variable to hold whether you like anchovies or not

```
private boolean likeAnchovies;
```

2. A beginning programmer is trying to write code to print out the even numbers starting with 2 and ending with 100. She is considering the 3 alternatives shown below. All of the code compiles, but she is unsure which will work. You can assume that all the text items displayed will be visible, that is, that the window is large enough and that they do not obscure each other.

- a. Which is correct? (There may be more than 1 that is correct.)

- i. 

```
int counter = 0;
while (counter <= 100)
{
    counter := counter + 2;
    new Text ((counter + "is an even number"), 10, 10 * counter, canvas);
}
```

- ii. 

```
int counter = 0;
while (counter < 100)
{
    counter = counter + 2;
    new Text ((counter + "is an even number"), 10, 10 * counter, canvas);
}
```

```
}
```

This is correct.

```
iii. int counter = 2;
    while (counter <= 100)
    {
        new Text ((counter + "is an even number"), 10, 10 * counter, canvas);
        counter = counter + 2;
    }
```

This is correct.

- b. Please explain what the incorrect code does. (There may be more than 1 that is incorrect.)

Choice i displays the even numbers from 2 to 102.

3. Write a declaration for a public method `onDoubleClick`, which should take as a parameter the point where the user performs the double click. Like the familiar `onMouseClicked` method, it does not return a value. Only write the signature (first line) of the method. Don't bother with writing anything after the first line!

```
public void onDoubleClick (Location point)
```

4. Write a method that takes two integers as parameters and returns the largest of the two.

```
public int max (int num1, int num2) {
    if (num1 >= num2) {
        return num1;
    }
    else {
        return num2;
    }
}
```

5. The program on the following page draws two rectangles on the screen when the program starts. The user should then be able to press the mouse button down on a shape and drag that shape.

You can assume that the program compiles and runs without producing any red errors (NullPointerException, etc.).

- a. (5 points) The program has a feature that the programmer had not really intended. If the two shapes overlap and the user begins a drag in the overlap area, what happens?

Both shapes are dragged.

- b. (5 points) After ending a drag, there is another unexpected behavior that can sometimes happen when the user presses and drags the mouse another time. What is that unexpected behavior and when does it occur?

If the user begins another drag while outside of both shapes, rect2 will move.

```
public class DragOneShape extends FrameWindowController
{
    private FilledRect rect1;
    private FilledRect rect2;
    private Location lastPoint;
    private boolean rect1Selected = false;
    private boolean rect2Selected = false;

    public void begin() {
        rect1 = new FilledRect (10, 10, 30, 30, canvas);
        rect2 = new FilledRect (50, 50, 30, 30, canvas);
    }

    public void onMousePress (Location point) {
        if (rect1.contains (point)) {
            rect1Selected = true;
        }
        if (rect2.contains (point)) {
            rect2Selected = true;
        }
        lastPoint = point;
    }

    public void onMouseDrag (Location point) {
        double dx = point.getX() - lastPoint.getX();
        double dy = point.getY() - lastPoint.getY();
        if (rect1Selected) {
            rect1.move (dx, dy);
        }
        if (rect2Selected) {
            rect2.move (dx, dy);
        }
        lastPoint = point;
    }

    public void onMouseRelease (Location point) {
        if (rect1Selected) {
            rect1Selected = false;
        }
        else if (rect2Selected) {
            rect2Selected = false;
        }
    }
}
```

```
}  
}
```

6.What will be displayed if the code below is executed?

```
x = 18;  
if (x < 20)  
{  
  new Text("little x", 10, 10, canvas);  
}  
else if (x > 15)  
{  
  new Text("big x", 10, 50, canvas)  
}
```

"little x" will be displayed.