Practice Problems
Event Handling, Networking, Threads

1 **Which library must be imported in order to use GUI event handling in Java?**

2 **What is the *Event Dispatch Thread*?**

3 **Consider the following class declaration.** Which methods *must* `Foo` implement?

```
class Foo implements ItemListener { ... }
```

4 **Consider the following code.** Write a private, inner class called `Listener` within `ClickCounter`. The class should provide the appropriate logic to increment `counter` and redisplay the `Label` object `l` when the `Button` object `b` is clicked. *Be sure to implement the appropriate interface!*

```
public class ClickCounter extends Applet {
    Button b;
    Label l;
    int counter = 0;

    public void init() {
        l = new Label("clicked " + counter + " times.");
        this.add(l);
        b = new Button("click me");
        this.add(b);
        b.addActionListener(new Listener());
    }

    // code goes below









}
```

5 **Consider the following code.** Write a private, inner class called `Listener` within `WhichButton`. The class should provide the approriate logic to print tot he console which button was clicked – i.e. if `a` is clicked you should print a message to the console saying so, if `b` is clicked you should do the same. *Be sure to implement the appropriate interface!*

```
public class WhichButton extends Applet {
    Button a, b;
    Listener lis = new Listener();

    public void init() {
        a = new Button("a");
        b = new Button("b");
        this.add(a);
        this.add(b);
        a.addActionListener(lis);
        b.addActionListener(lis);
    }

    \\ code goes here









}
```

6 **Consider the following class declaration.** Which methods *must* `Foo` implement?

```
class Foo implements KeyListener { ... }
```

7 **Write an applet called `ClickLocator`.** It should display the X and Y coordinates of the mouse each time that it is clicked within the applet. Include a private, inner class called `Listener` which implements the `MouseListener` interface. It should also have a `paint()` method.

8 **Re-write the `Listener` class from the previous question using an adapter class.** *You only need to write the listener class, nothing else is necessary.*

9 **Name one advantage and one disadvantage of using an adapter class?**

10 **What is the difference between low-level events and high-level (or, semantic) events?**

11 **What is the difference between `paint()` and `repaint()`?**

12 **What is the `Transmission Control Protocol` (TCP) responsible for? What are TCP tranmission units called?**

13 **What is the `Internet Protocol` (IP) responsible for? What are IP tranmission units called?**

14 **What two peices of information are required to open a socket?**

15 **In Java, what is the difference between a `Socket` and a `ServerSocket`?**

16 **In *Hypertext Tranfer Protocol* (HTTP), which of the client and server sends the request and which the response?**

17 **Imagine you were to write a program that read multiline data over a network.** Explain why you would need to establish a protocol to handle this situation and how you might design such a protocol. *No need to write code here, just English.*

18 **What are the two ways to create threads using the Java libraries?**

19 **What is a context switch?**

20 **Consider the following code.** Then, answer the proceeding questions.

```
class FooBar {
    public static void main(String [] args) {
        Thread t = new Thread() {
            public void run() {
                System.out.println("Foo!");
            }
        };

        t.start();
        System.out.println("Bar!");
    }
}
```

What will the code above print?

Is it guaranteed to print this?

21 **Consider the following code.** Then, answer the proceeding questions.

```
class FooBar {
    public static void main(String [] args) {
        Thread t = new Thread() {
            public void run() {
                System.out.println("Foo!");
            }
        };

        t.start();
        t.join();
        System.out.println("Bar!");
    }
}
```

What will the code above print?

Is it guaranteed to print this? Why or why not?

22 **Consider the code below.** Then, answer the proceeding questions.

```
class Foo {
    int x = 0;

    public void add() {
        if(x == 0) x++;
    }
}
```

Why is the code above problematic in a multithreaded environment? Explain.

How can you fix the problem? Explain.

23 **Determine whether the following statements are true or false.**

_____ All GUI events in Java are handled with a single thread
_____ GUI components send events directly to their listeners
_____ `KeyEvent`s are low-level events
_____ `MouseEvent`s are high-level events
_____ `ActionEvent`s are low-level events
_____ `ItemEvent`s are high-level events
_____ A client is said to listen on a port
_____ A server is said to listen on a port
_____ Mutable objects are thread safe
_____ Immutable objects are thread safe