

**Q1.** The following code implements the Command design pattern (example is taken from Wikipedia).

```
/* The Command interface */
public interface Command {
    void execute();
}

/* The Invoker class */
public class Switch {
    public void storeAndExecute(Command cmd) {
        cmd.execute();
    }
}

/* The Receiver class */
public class Light {

    public void turnOn() {
        System.out.println("The light is on");
    }

    public void turnOff() {
        System.out.println("The light is off");
    }
}

/* The Command for turning on the light - ConcreteCommand #1 */
public class FlipUpCommand implements Command {
    private Light theLight;

    public FlipUpCommand(Light light) {
        this.theLight = light;
    }
    /* INCOMPLETE */
}

/* The Command for turning off the light - ConcreteCommand #2 */
public class FlipDownCommand implements Command {
    private Light theLight;

    public FlipDownCommand(Light light) {
        this.theLight = light;
    }
}
```

```
/* INCOMPLETE */  
}
```

a) Write (pseudo)code that completes classes `FlipUpCommand` and `FlipDownCommand` [4pts]

b) Write a test program/class/"main function" that uses the implemented command pattern, that turns the light on, and then off. [6pts]

**Q2.** In the Lesson 9 lecture videos, we cover four Quality Attributes (QAs) (*Availability, Performance, Security, Testability*). Pick the biggest software project you have ever been involved with -- this could be your senior design, your internship, or course projects, etc. Pick one QA from this list that you think is applicable to the project you chose and read Chapter 4 plus the corresponding chapter for the QA, to study the tactics included in the book to achieve the QA.

For this assignment: a) describe the project you chose briefly, b) explain why the QA you chose is important to the project, and c) write about the things you (or others who you work with) have done, that fall into one of the tactics to address the QA for the project. [20ps]

For example, if the QA you picked was *Performance*, then you should read Chapter 4, plus Chapter 8 from the [BASS] textbook, available on Canvas in the Lesson 9 module. Figure 8.3 shows the Performance Tactics in two categories: "Control Resource Demand" and "Manage Resources". You should then write about what you (or your team) did to "control resource demand" or "manage resources".