Exercise - 2: SOLID Principles (35 Marks)

Task 1) (10 marks) Consider the following classes in answering parts a and b.

Part a (3 marks) Which SOLID principle is this program violating? Briefly explain.

Part b (7 marks) If needed, re-write each class **completely** to remove the code smell in question. If not, simply write **no change needed** for a class.

Write any classes or interfaces you are adding to this program in this space:

```java
abstract public class Vehicle {

    abstract public String getVehicleType ();
    abstract public String getEngineType ();
}
```

```java
//If this class needs to change, rewrite it
//completely. If not, write: "No change needed".
```

```java
public class Car extends Vehicle{

        private String vehicleType;
        private String engineType;

        Car(String vType, String eType) {
                vehicleType = vType;
                engineType = eType;
        }
        @Override
        public String getVehicleType() {
                return vehicleType;
        }
        @Override
        public String getEngineType() {
                return engineType;
        }
}
```

```java
//If this class needs to change, rewrite it
//completely. If not, write: “No change needed”.
```

```java
public class Bicycle extends Vehicle{

        private String vehicleType;

        Bicycle(String vType) {
                vehicleType = vType;
        }
        @Override
        public String getVehicleType() {
                return vehicleType;
        }

        @Override
        public String getEngineType() {
                return null;
        }
}
```

```java
//If this class needs to change, rewrite it
//completely. If not, write: “No change needed”.
```

Task 2) (15 marks) Consider the following classes in answering parts a, b, and c.

```java
public class GraphicCreator {
      public void drawShape(Shape s) {
            if (s.getShapeType() == 1)
                  drawSquare((Square) s);
            else if (s.getShapeType() == 2)
                  drawCircle((Circle) s);
      }
      public void drawCircle(Circle c) {//Some code. }
      public void drawSquare(Square s) {//Some code. }
 }
```

```java
public class Shape {

      private int shapeType;

      Shape (int type){shapeType = type;}
      public int getShapeType() {
            return shapeType;
      }
}
```

```java
public class Circle extends Shape{
      Circle (){super(2);}
}
```

```java
public class Square extends Shape{
      Square (){super(1);}
}
```

Part a (5 marks) Draw the class diagram for the classes above. Make sure to include all fields and methods in your class diagram.

Part b (4 marks) Which SOLID principle is this program violating? Briefly explain.

Part c (6 marks) Draw a class diagram for a proper design that removes the code smell in the above program. Clearly include all fields and methods in your class diagram.

What to hand in: Please submit your solutions in a pdf file for tasks 1 and 2.

How to submit: Submit your PDFs from Exercises 1 – 3 to D2L.