Sample Lab Quiz 2

Q1(50 points): Use the following 3 classes to answer the questions below

```
abstract class Crystal(var size: Double) {

 def value(): Double

 def grow(): Unit = {
   this.size += 1.0
 }

}

class Quartz(quartzSize: Double) extends Crystal(quartzSize) {

 override def value(): Double = {
   this.size * 5.0
 }

}

class Salt(saltSize: Double) extends Crystal(saltSize) {

 override def value(): Double = {
   this.size * 0.5
 }

 override def grow(): Unit = {
   this.size += 4.0
 }

}
```

Q1 Part 1

```
object Part1 {

 def main(args: Array[String]): Unit = {
   val quartz: Quartz = new Quartz(5.0)
   val salt: Salt = new Salt(6.0)
   val crystal: Crystal = salt

   // 5 points each value call
   println(quartz.value())
   quartz.grow()
   println(quartz.value())

   println(salt.value())
   salt.grow()
   println(salt.value())
   crystal.grow()
   println(salt.value())
   //
 }
```

```
}
```

What is printed at each of the 5 calls of println in this main method? (5 points each)

Q1 Part 2

```
object Part2 {
 def totalValue(crystals: List[Crystal]): Double = {
   var value = 0.0
   for(crystal <- crystals){
     value += crystal.value()
   }
   value
 }

 def growAll(crystals: List[Crystal]): Unit = {
   for(crystal <- crystals){
     crystal.grow()
   }
 }

 def main(args: Array[String]): Unit = {

   val quartz: Quartz = new Quartz(8.0)
   val salt: Salt = new Salt(4.0)
   val crystal: Crystal = salt

   val crystals: List[Crystal] = List(quartz, salt, crystal, new Quartz(1.0))

   // 10 points
   println(totalValue(crystals))

   growAll(crystals)

   // 15 points
   println(totalValue(crystals))

 }

}
```

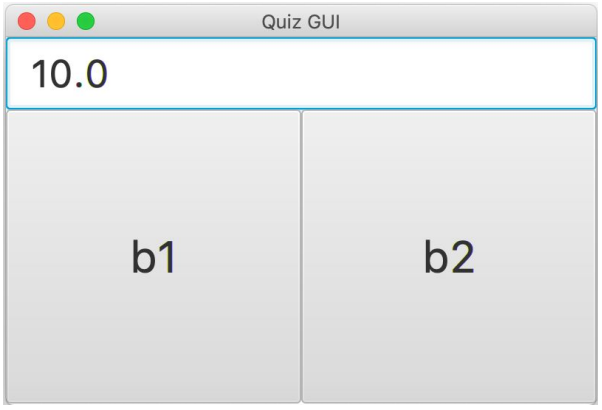
What is printed at each of the 2 calls of println in this main method? (10 and 15 points respectively)

Q2(50 points): Use the following MVC structured program to answer the questions below

```
class Model {

 var number: Int = 10

 def displayNumber(): Double = {
   this.number
 }
```

```
 def apiEndPoint(magnitude: Int): Unit = {
   this.number += magnitude
 }

 def command(): Unit = {
   this.number = 0
 }
}


class Controller(model: Model) {

 def b1Pressed(event: ActionEvent): Unit = model.apiEndPoint(10)

 def b2Pressed(event: ActionEvent): Unit = model.command()

 def userAction3(event: KeyEvent): Unit = {
   event.getCode.getName match {
     case "A" => model.apiEndPoint(2)
     case "B" => model.apiEndPoint(2)
     case "C" => model.apiEndPoint(5)
     case "D" => model.apiEndPoint(0)
     case "E" => model.apiEndPoint(0)
     case "X" => model.command()
     case _ => model.apiEndPoint(-1)
   }
 }

}

class QuizButton(display: String, action: EventHandler[ActionEvent]) extends Button {
 val size = 200
 minWidth = size
 minHeight = size
 onAction = action
 text = display
 style = "-fx-font: 30 ariel;"
}


object View extends JFXApp {

 val model: Model = new Model()
 val controller: Controller = new Controller(model)

 var textField: TextField = new TextField {
   editable = false
   style = "-fx-font: 26 ariel;"
   text.value = model.displayNumber().toString
 }

 stage = new PrimaryStage {
   title = "Quiz GUI"
   scene = new Scene() {
     content = List(
       new GridPane {
         add(textField, 0, 0, 2, 1)
         add(new QuizButton("b1", controller.b1Pressed), 0, 1)
```

```
        add(new QuizButton("b2", controller.b2Pressed), 1, 1)
      }
    )
  }

  addEventFilter(KeyEvent.KEY_PRESSED, controller.userAction3)

  // update the display after every event
  addEventFilter(Event.ANY, (event: Event) => textField.text.value = model.displayNumber().toString)

}
}
```



What is displayed in the text field after each of the following sequences of user inputs? Assume the program has been started just before the inputs for each of the 5 sequences (10 points each)

1. The user presses the button labelled b1

2. The user presses the buttons: b1, b1, b2, then b1

3. The user types "ACE" on their keyboard

4. The user types "ABXRTD" on their keyboard

5. The user presses the buttons: b1, b2, b1, b1 then types "ASDF" on their keyboard