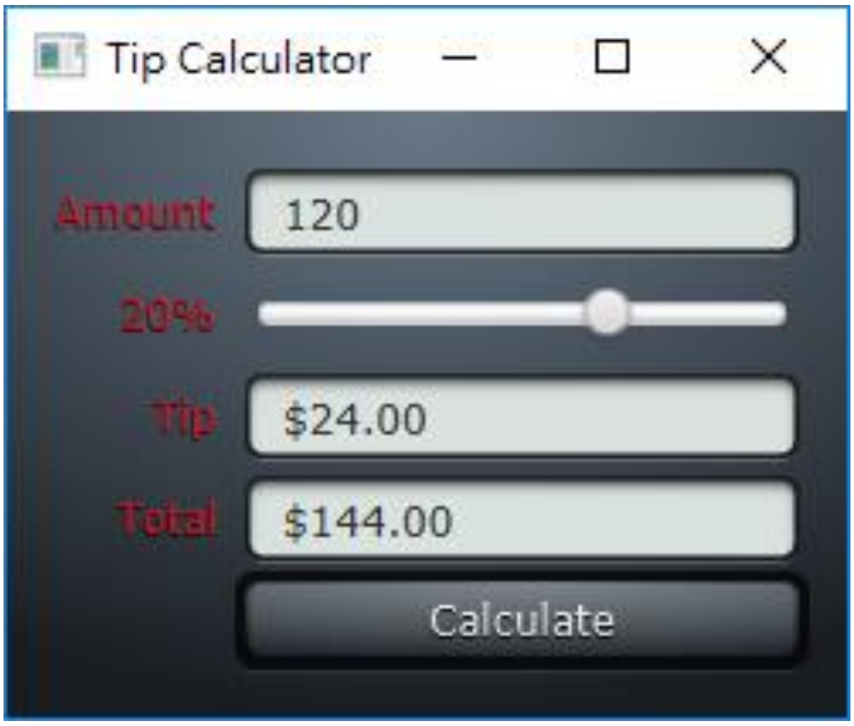
Course 03

Please implement following GUI by Scene Builder and complete the application with given codes. Study the codes carefully and make sure you get a best understanding of what/how/when the programs do.

1. Tip Calculator

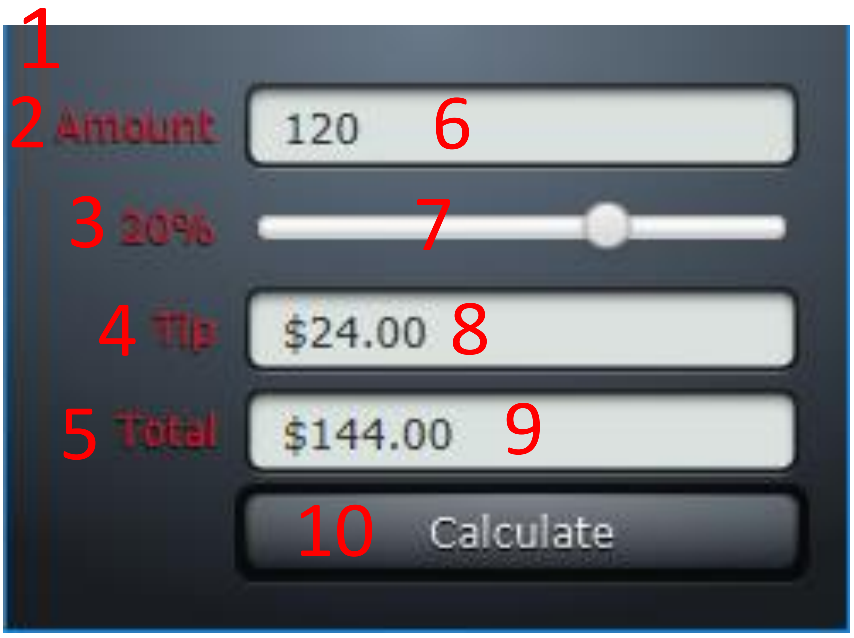


120

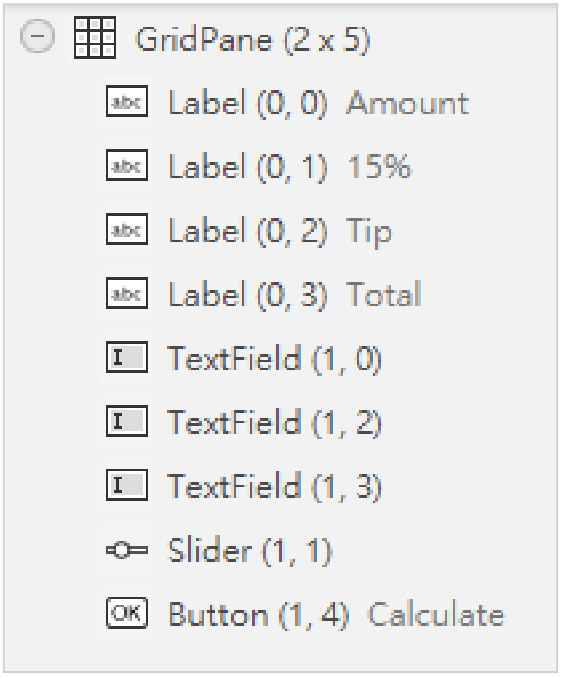
$24.00

$144.00

GUI Description:



Hierarchy:



GridPane (2 x 5)
Label (0, 0) Amount
Label (0, 1) 15%
Label (0, 2) Tip
Label (0, 3) Total
TextField (1, 0)
TextField (1, 2)
TextField (1, 3)
Slider (1, 1)
Button (1, 4) Calculate

0) File Name: TipCalculator.fxml
Controller Class: TipCalculatorController

1) GridPane

a) Stylesheets: TipCalculator.css
b) styleClass: background
c) 2 columns and 5 rows

d) Pref Width: Reset to default
e) Pref Height: Reset to default
f) Column 0
   Halignment: RIGHT
   Pref Width: Reset to default
g) Column 1
   Halignment: RIGHT
   Pref Width: Reset to default
h) Padding: 14 14 14 14 (TOP, RIGHT, BOTTOM, LEFT)
i) Hgap: 8

2) Label

a) styleClass: lab
b) Text: “Amount”

3) Label

a) styleClass: lab
b) fx:id: tipPercentageLabel
c) Text: “15%”

4) Label

a) styleClass: lab
b) Text: “Tip”

5) Label

a) styleClass: lab
b) Text: “Total”

6) TextField

a) styleClass: tex-field
b) fx:id: amountTextField

7) Slider

a) fx:id: tipPercentageSlider
b) Max: 30
c) Value: 15
d) Block Increment: 5

8) TextField

a) styleClass: tex-field

b) fx:id: tipTextField
c) Editable: uncheck
d) Focus Traversable: uncheck

9) TextField

a) styleClass: tex-field
b) fx:id: totalTextField
c) Editable: uncheck
d) Focus Traversable: uncheck

10) Button

a) id: button
b) Text: “Calculate”
c) Max Width: MAX_VALUE
d) On Action: calculateButtonPressed

TipCalculator.css

```
.background {
    -fx-background-repeat: repeat;
    -fx-background-color:
              linear-gradient(#38424b 0%, #1f2429 20%, #191d22 100%),
              linear-gradient(#20262b, #191d22),
              radial-gradient(center 50% 0%, radius 100%,
              rgba(114,131,148,0.9),
              rgba(255,255,255,0));
}

.lab {
    -fx-font-family: "Verdana";
    -fx-font-size: 12;
    -fx-text-fill: rgb(162,21,35,1);
    -fx-effect: dropshadow(one-pass-box, rgb(0,0,0,0.6), 0,0,0,1);
}

#button .text {
    -fx-effect: dropshadow(one-pass-box, rgb(0,0,0,0.8), 0,0,0,1);
}

#button {
    -fx-background-color:
                rgb(255,255,255,0.08), rgb(0,0,0,0.8), #090a0c,
                linear-gradient(#4a5661 0%, #1f2429 20%, #1f242a 100%),
                linear-gradient(#242a2e, #23282e),
                radial-gradient(center 50% 0%, radius 100%,
                                rgba(135,142,148,0.9),
                                rgba(255,255,255,0));
    -fx-background-radius: 7,6,5,4,3,5;
    -fx-background-insets: -3 -3 -4 -3, -3, 0, 1, 2, 0;
    -fx-font-family: "Verdana";
    -fx-text-fill: blue;
    -fx-text-fill: linear-gradient(white, #d0d0d0);
}

#button:focused, #button:hover {
    -fx-background-color:
                 rgb(255,255,255,0.08), rgb(0,0,0,0.8), #090a0c,
                 linear-gradient(#4a5661 0%, #1f2429 20%, #1f242a 100%),
                 linear-gradient(#3f4950, #23282e),
                 radial-gradient(center 50% 0%, radius 100%,
                 rgba(135,142,148,0.9), rgba(255,255,255,0));
}

.tex-field {
    -fx-background-color:
                 rgb(255,255,255,0.3), linear-gradient(rgb(0,0,0,0.5),
                 rgb(0,0,0,0.8) 50%), rgb(218,226,224);
    -fx-background-radius: 6,5,4;
    -fx-background-insets: 0 0 -1 0, 0, 1.5;
    -fx-padding: 6 10 4 10;
    -fx-effect: innershadow(gaussian, rgb(0,0,0,0.8), 5, 0, 0, 2);
    -fx-font-family: "Verdana";
}

.tex-field:focused {
    -fx-background-color:
                rgb(235,235,235,0.5), rgb(0,0,0,0.4), rgb(255,255,255);
    -fx-test-fill: rgb(128,128,128);
}
```

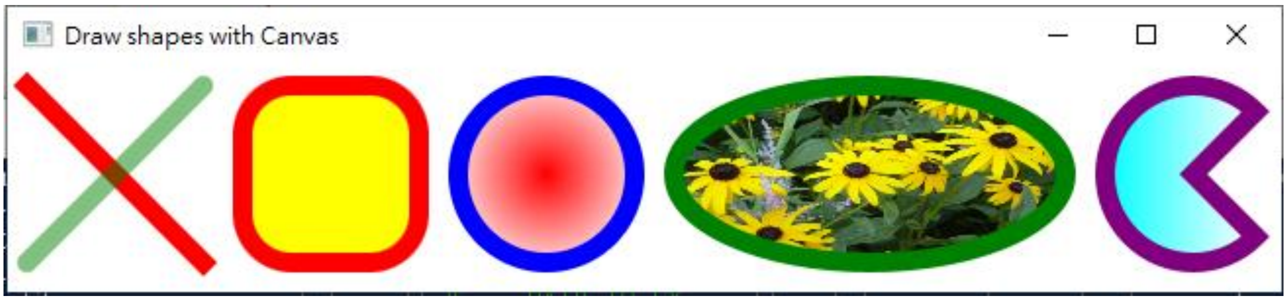
TipCalculator.java

```java
// Main application class that loads and displays the Tip Calculator's GUI.
import javafx.application.Application;
import javafx.fxml.FXMLLoader;
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.stage.Stage;

public class TipCalculator extends Application {
  @Override
  public void start(Stage stage) throws Exception {
    Parent root =
      FXMLLoader.load(getClass().getResource("TipCalculator.fxml"));

    Scene scene = new Scene(root); // attach scene graph to scene
    stage.setTitle("Tip Calculator"); // displayed in window's title bar
    stage.setScene(scene); // attach scene to stage
    stage.show(); // display the stage
  }

  public static void main(String[] args) {
    // create a TipCalculator object and call its start method
    launch(args);
  }
}
```

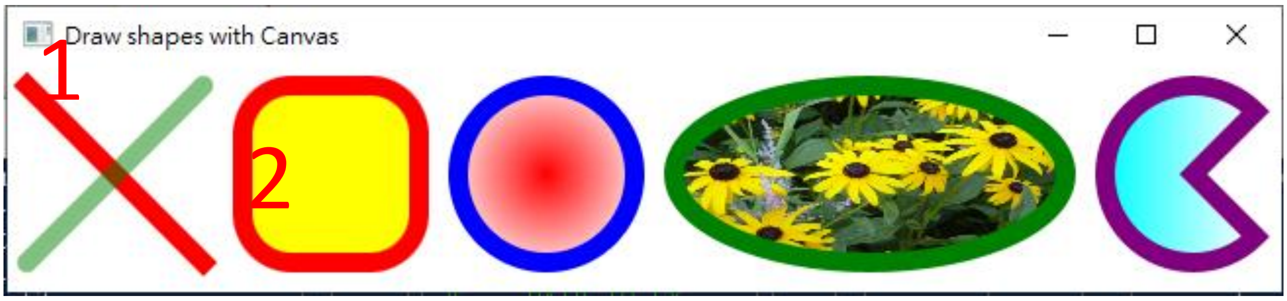
TipCalculatorController.java

```java
// TipCalculatorController.java
// Controller that handles calculateButton and tipPercentageSlider events
import java.math.BigDecimal;
import java.math.RoundingMode;
import java.text.NumberFormat;
import javafx.beans.value.ChangeListener;
import javafx.beans.value.ObservableValue;
import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.scene.control.Label;
import javafx.scene.control.Slider;
import javafx.scene.control.TextField;

public class TipCalculatorController {
   // formatters for currency and percentages
   private static final NumberFormat currency =
      NumberFormat.getCurrencyInstance();
   private static final NumberFormat percent =
      NumberFormat.getPercentInstance();

   private BigDecimal tipPercentage = new BigDecimal(0.15); // 15% default

   // GUI controls defined in FXML and used by the controller's code
   @FXML
   private TextField amountTextField;

   @FXML
   private Label tipPercentageLabel;

   @FXML
   private Slider tipPercentageSlider;

   @FXML
   private TextField tipTextField;

   @FXML
   private TextField totalTextField;

   // calculates and displays the tip and total amounts
   @FXML
   private void calculateButtonPressed(ActionEvent event) {
      try {
         BigDecimal amount = new BigDecimal(amountTextField.getText());
         BigDecimal tip = amount.multiply(tipPercentage);
         BigDecimal total = amount.add(tip);

         tipTextField.setText(currency.format(tip));
         totalTextField.setText(currency.format(total));
      }
      catch (NumberFormatException ex) {
         amountTextField.setText("Enter amount");
         amountTextField.selectAll();
         amountTextField.requestFocus();
      }
   }

   // called by FXMLLoader to initialize the controller
   public void initialize() {
      // 0-4 rounds down, 5-9 rounds up
      currency.setRoundingMode(RoundingMode.HALF_UP);

      // listener for changes to tipPercentageSlider's value
      tipPercentageSlider.valueProperty().addListener(
         new ChangeListener<Number>() {
            @Override
            public void changed(ObservableValue<? extends Number> ov,
               Number oldValue, Number newValue) {
               tipPercentage =
                  BigDecimal.valueOf(newValue.intValue() / 100.0);
               tipPercentageLabel.setText(percent.format(tipPercentage));
            }
         }
      );
   }
}
```

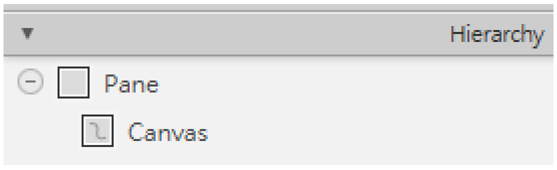
2. Canvas Shape



GUI Description:



Hierarchy:



0) **File Name: CanvasShapes.fxml**
   Controller Class: CanvasShapesController

1) **Pane**

2) **Canvas**
   a) fx:id :drawingCanvas
   b) Width: 650
   c) Height:115

CanvasShapes.java

```
// CanvasShapes.java
import javafx.application.Application;
import javafx.fxml.FXMLLoader;
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.stage.Stage;

public class CanvasShapes extends Application {
   @Override
   public void start(Stage stage) throws Exception {
      Parent root =
         FXMLLoader.load(getClass().getResource("CanvasShapes.fxml"));

      Scene scene = new Scene(root);
      stage.setTitle("Draw shapes with Canvas");
      stage.setScene(scene);
      stage.show();
   }

   public static void main(String[] args) {
      launch(args);
   }
}
```

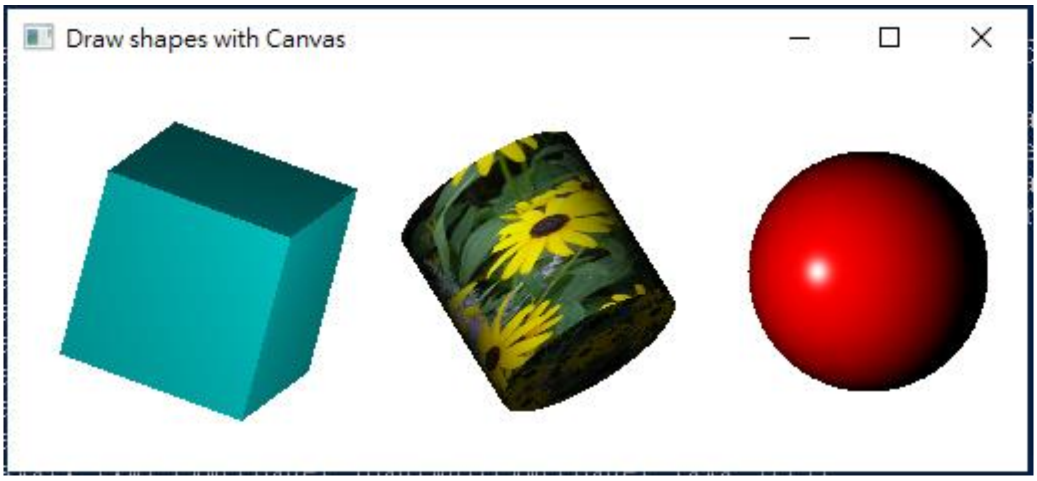
CanvasShapesController.java

```
// Fig. 22.14: CanvasShapesController.java
// Drawing on a Canvas.
import javafx.fxml.FXML;
import javafx.scene.canvas.Canvas;
import javafx.scene.canvas.GraphicsContext;
import javafx.scene.image.Image;
import javafx.scene.paint.Color;
import javafx.scene.paint.CycleMethod;
import javafx.scene.paint.ImagePattern;
import javafx.scene.paint.LinearGradient;
import javafx.scene.paint.RadialGradient;
import javafx.scene.paint.Stop;
```

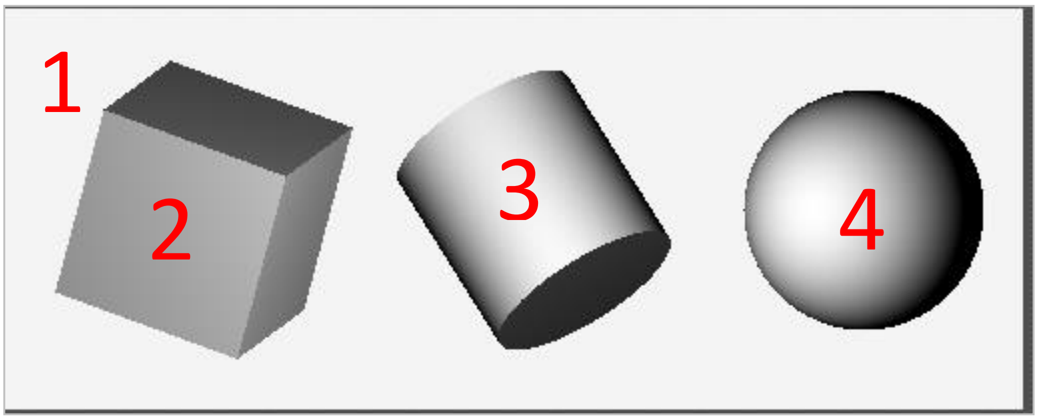
```java
import javafx.scene.shape.ArcType;
import javafx.scene.shape.StrokeLineCap;

public class CanvasShapesController {
  // instance variables that refer to GUI components
  @FXML private Canvas drawingCanvas;

  // draw on the Canvas
  public void initialize() {
    GraphicsContext gc = drawingCanvas.getGraphicsContext2D();
    gc.setLineWidth(10); // set all stroke widths

    // draw red line
    gc.setStroke(Color.RED);
    gc.strokeLine(10, 10, 100, 100);

    // draw green line
    gc.setGlobalAlpha(0.5); // half transparent
    gc.setLineCap(StrokeLineCap.ROUND);
    gc.setStroke(Color.GREEN);
    gc.strokeLine(100, 10, 10, 100);

    gc.setGlobalAlpha(1.0); // reset alpha transparency

    // draw rounded rect with red border and yellow fill
    gc.setStroke(Color.RED);
    gc.setFill(Color.YELLOW);
    gc.fillRoundRect(120, 10, 90, 90, 50, 50);
    gc.strokeRoundRect(120, 10, 90, 90, 50, 50);

    // draw circle with blue border and red/white radial gradient fill
    gc.setStroke(Color.BLUE);
    Stop[] stopsRadial =
      {new Stop(0, Color.RED), new Stop(1, Color.WHITE)};
    RadialGradient radialGradient = new RadialGradient(0, 0, 0.5, 0.5,
      0.6, true, CycleMethod.NO_CYCLE, stopsRadial);
    gc.setFill(radialGradient);
    gc.fillOval(230, 10, 90, 90);
    gc.strokeOval(230, 10, 90, 90);
```

```
      // draw ellipse with green border and image fill
      gc.setStroke(Color.GREEN);
      gc.setFill(new ImagePattern(new Image("yellowflowers.png")));
      gc.fillOval(340, 10, 200, 90);
      gc.strokeOval(340, 10, 200, 90);

      // draw arc with purple border and cyan/white linear gradient fill
      gc.setStroke(Color.PURPLE);
      Stop[] stopsLinear =
         {new Stop(0, Color.CYAN), new Stop(1, Color.WHITE)};
      LinearGradient linearGradient = new LinearGradient(0, 0, 1, 0,
         true, CycleMethod.NO_CYCLE, stopsLinear);
      gc.setFill(linearGradient);
      gc.fillArc(560, 10, 90, 90, 45, 270, ArcType.ROUND);
      gc.strokeArc(560, 10, 90, 90, 45, 270, ArcType.ROUND);
   }
}
```

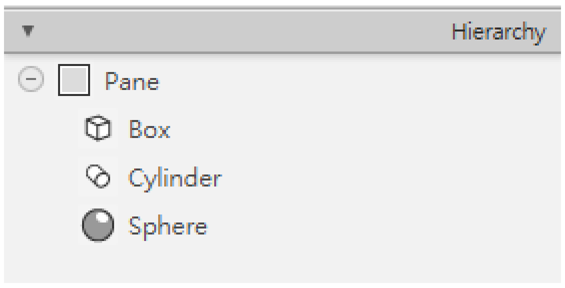
3. ThreeDimensionalShapes



GUI Description:



Hierarchy:



0) File Name: ThreeDimensionalShapes.fxml
Controller Class: ThreeDimensionalShapesController.java

1) **Pane**
    a) Pref Width:510
    b) Pref Height:200

2) **Box**
    a) fx:id :box
    b) Width: 100
    c) Height: 100
    d) Depth: 100
    e) Rotate: 30
    f) Rotation axis:1 1 1
    g) LayoutX :100
    h) LayoutY:100

3) **Cylinder**
    a) fx:id : cylinder
    b) Height: 100
    c) Radius: 50
    d) Rotate: -45
    e) Rotation axis: 1 1 1
    f) LayoutX : 265
    g) LayoutY: 100

4) **Sphere**
    a) fx:id : sphere
    b) Radius: 60
    c) Rotate:0
    d) Rotation axis : 0 0 1
    e) LayoutX : 430
    f) LayoutY: 100

ThreeDimensionalShapes.java

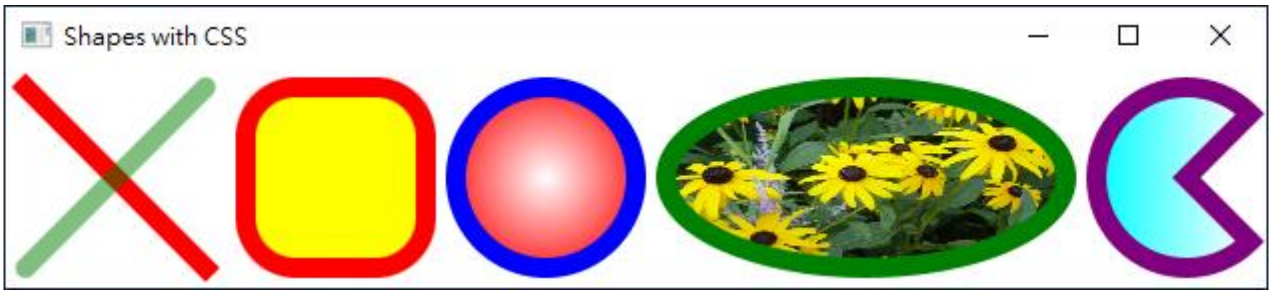
```java
// ThreeDimensionalShapes.java
import javafx.application.Application;
import javafx.fxml.FXMLLoader;
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.stage.Stage;
```

```java
public class ThreeDimensionalShapes extends Application {
   @Override
   public void start(Stage stage) throws Exception {
      Parent root =

FXMLLoader.load(getClass().getResource("ThreeDimensionalShapes.fxml"));

      Scene scene = new Scene(root);
      stage.setTitle("Draw shapes with Canvas");
      stage.setScene(scene);
      stage.show();
   }

   public static void main(String[] args) {
      launch(args);
   }
}
```

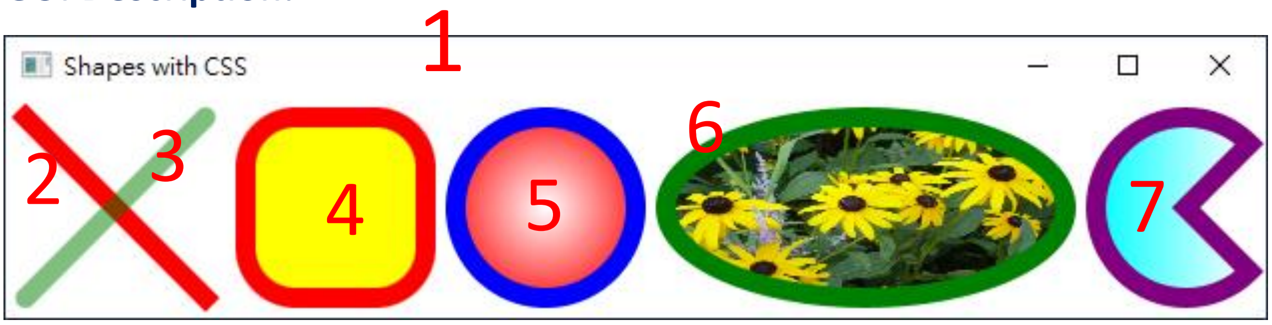
ThreeDimensionalShapesController.java

```java
// Fig. 22.15: ThreeDimensionalShapesController.java
// Setting the material displayed on 3D shapes.
import javafx.fxml.FXML;
import javafx.scene.paint.Color;
import javafx.scene.paint.PhongMaterial;
import javafx.scene.image.Image;
import javafx.scene.shape.Box;
import javafx.scene.shape.Cylinder;
import javafx.scene.shape.Sphere;

public class ThreeDimensionalShapesController {
   // instance variables that refer to 3D shapes
   @FXML private Box box;
   @FXML private Cylinder cylinder;
   @FXML private Sphere sphere;

   // set the material for each 3D shape
   public void initialize() {
        // define material for the Box object
        PhongMaterial boxMaterial = new PhongMaterial();
        boxMaterial.setDiffuseColor(Color.CYAN);
        box.setMaterial(boxMaterial);

        // define material for the Cylinder object
        PhongMaterial cylinderMaterial = new PhongMaterial();
        cylinderMaterial.setDiffuseMap(new Image("yellowflowers.png"));
        cylinder.setMaterial(cylinderMaterial);

        // define material for the Sphere object
        PhongMaterial sphereMaterial = new PhongMaterial();
        sphereMaterial.setDiffuseColor(Color.RED);
        sphereMaterial.setSpecularColor(Color.WHITE);
        sphereMaterial.setSpecularPower(32);
        sphere.setMaterial(sphereMaterial);
    }
}
```

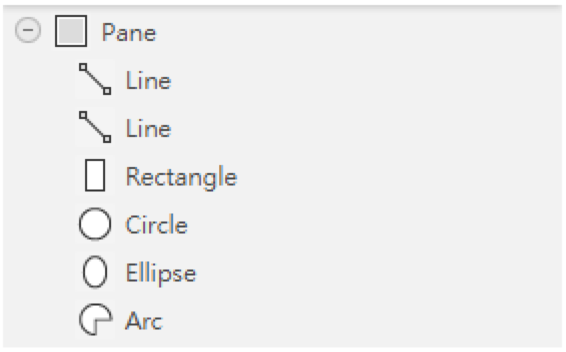
4. Basic Shapes



GUI Description:



Hierarchy:



0) File Name: BasicShapes.fxml
Controller Class: none

1) Pane
   a) Stylesheets: BasicShapes.css
   b) id: Pane
   c) Min Width: USE_COMPUTED_SIZE
   d) Min Height: USE_COMPUTED_SIZE

    e) Pref Width: 630
    f) Pref Height: 110
    g) Max Width: USE_COMPUTED_SIZE
    h) Max Height: USE_COMPUTED_SIZE

2) **Line**
    a) id: line1
    b) Layout X: 0
    c) Layout Y: 0
    d) Start X: 10
    e) Start Y: 10
    f) End X: 100
    g) End Y: 100
    h) fx:id: line2

3) **Line**
    a) Layout X: 0
    b) Layout Y: 0
    c) Start X: 100
    d) Start Y: 10
    e) End X: 10
    f) End Y: 100
    g) fx:id: line2

4) **Rectangle**
    a) Arc Width: 0
    b) Fill: Black
    c) Arc Height: 0
    d) Stroke: Reset to Default
    e) Strike Type: CENTERED
    f) Width: 90
    g) Height: 90
    h) Layout X: 120
    i) Layout Y: 10
    j) fx:id: rectangle

5) **Circle**
    a) Fill: Black
    b) Stroke: Reset to Default
    c) Strike Type: CENTERED

d) Radius: 45
e) Center X: 270
f) Center Y: 55
g) fx:id: circle

6) Ellipse

a) Fill: Black
b) Stroke: Reset to Default
c) Strike Type: CENTERED
d) Radius X: 100
e) Radius Y: 45
f) Center X: 430
g) Center Y: 55
h) fx:id: ellipse

7) Arc

a) Fill: Black
b) Stroke: Reset to Default
c) Strike Type: CENTERED
d) Radius X: 45
e) Radius Y: 45
f) Start Angle: 45
g) Length: 270
h) Center X: 590
i) Center Y: 55
j) fx:id: arc

BasicShapes.css

```css
/* BasicShapes.css */
/* CSS that styles various two-dimensional shapes */

Line, Rectangle, Circle, Ellipse, Arc {
   -fx-stroke-width: 10;
}

#line1 {
   -fx-stroke: red;
}
```

```
#line2 {
    -fx-stroke: rgba(0%, 50%, 0%, 0.5);
    -fx-stroke-line-cap: round;
}

Rectangle {
   -fx-stroke: red;
   -fx-arc-width: 50;
   -fx-arc-height: 50;
   -fx-fill: yellow;
}

Circle {
   -fx-stroke: blue;
   -fx-fill: radial-gradient(center 50% 50%, radius 60%, white, red);
}

Ellipse {
   -fx-stroke: green;
   -fx-fill: image-pattern("yellowflowers.png");
}

Arc {
   -fx-stroke: purple;
   -fx-fill: linear-gradient(to right, cyan, white);
}
```

BasicShapes.java

```
// BasicShapes.java
import javafx.application.Application;
import javafx.fxml.FXMLLoader;
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.stage.Stage;

public class BasicShapes extends Application {
   @Override
  public void start(Stage stage) throws Exception {
     Parent root =
        FXMLLoader.load(getClass().getResource("BasicShapes.fxml"));

     Scene scene = new Scene(root);
     stage.setTitle("Shapes with CSS");
     stage.setScene(scene);
     stage.show();
  }

  public static void main(String[] args) {
     launch(args);
  }
}
```