October 19th, 2021

Exercises for Programming Practice 1

The submitted program will be evaluated as described in “Lesson Plan (2021)”.

Data used in Exercise 3 and 4 can be obtained from “Data1019.txt” of “Java 04” page Resource of “Programming Practice 1”, manaba+R.

Note:

- ✓ Do not create “module-info.java”, when you create a Java Project.
- ✓ Do not set Package name in the window “New Java Class”.
- ✓ The following information must be included as a comment at the first part of the program.
  - ➢ Contents of the program
    - ✧ Do not use the title of exercise for “contents of the program” Think about “contents of the program” yourself.
  - ➢ Submission date
  - ➢ Program creator

The deadline for submitting the programs is 17:50 on October 19th, 2021.

Exercise 3 (file name “Exercise3.java”)

Create Java program “Exercise3.java” that satisfies the following conditions:

(a) The window size is 400 horizontal pixels and 300 vertical pixels.

(b) It displays four rectangles with width 60 pixels and height 30 pixels as shown in Figure 1. Use array variables “position” and “color”. The variable “position” gives top left coordinate of each rectangle. The color of each rectangle uses the value of the variable “color” in order.

```
int[][] position = {{100, 90}, {250, 70}, {70, 180}, {200, 150}};
Color[] color = {Color.green, Color.red, Color.blue, Color.cyan};
```

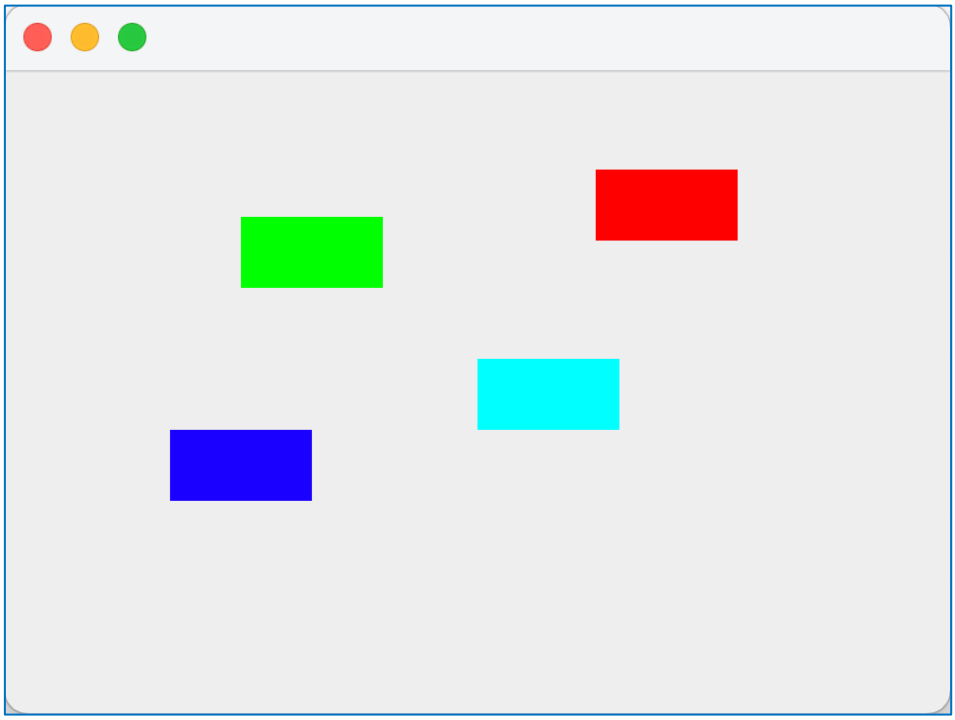

Figure 1. Four rectangles.

Figure 2 shows the outline of “Exercise3.java”.

Exercise3.java

```
1  /* Comment */
2
3  import java.awt.Color;
6
7  public class Exercise3 extends JFrame{
8      int[][] position = {{100, 90}, {250, 70}, {70, 180}, {200, 150}};
9      Color[] color = {Color.green, Color.red, Color.blue, Color.cyan};
10
11     public Exercise3() {
12         setSize(400,300);   // setting window size
13         setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
14         setVisible(true);
15     }
16
17     /***** paint *****/
18     public void paint(Graphics g){
19         for(int i = 0; i < position.length; i++) {
20
21             /* Complete this part */
22         }
23     }
24
25     public static void main(String[] args) {
26         new Exercise3();
27     }
28 }
```

Figure 2. The outline of “Exercise1.java”.

Exercise 4 (file name "Exercise4.java")

Create Java program "Exercise4.java" that displays four pacmans shown in Figure 3 that satisfies the following conditions:

(a) The window size is 400 horizontal pixels and 300 vertical pixels.

(b) Use the array "position" for values of topLeftX and topLeftY in order.

(c) Use the array "color" to draw pacman in order.

(d) Use the array "size" to use the width and height of pacman in order.

```
int[] size = {60, 40, 90, 120};
```

(e) Use fillArc method as shown in Figure 4 to draw pacman.

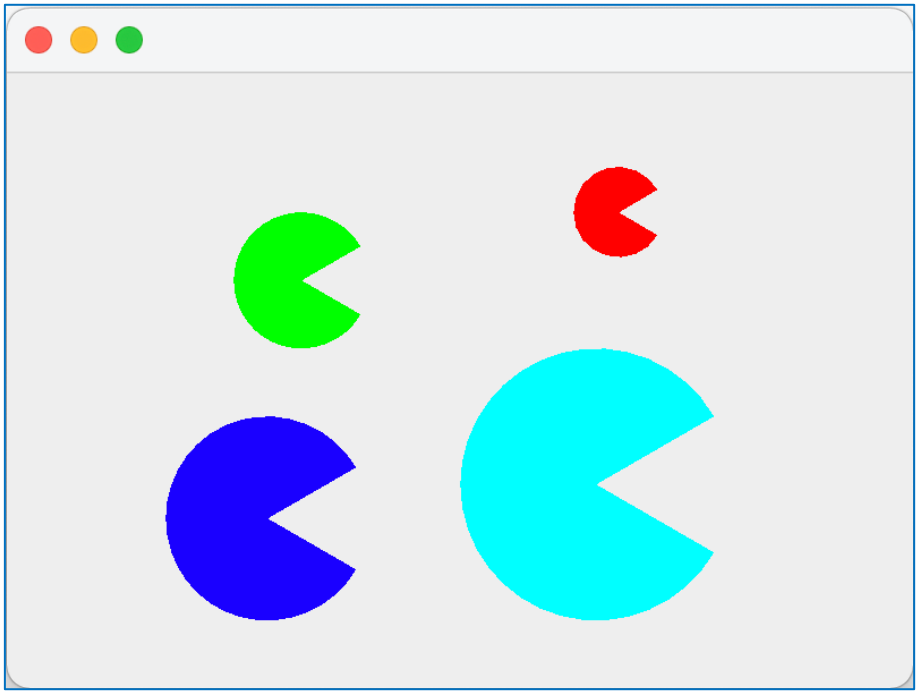

Figure 3. Four pacmans

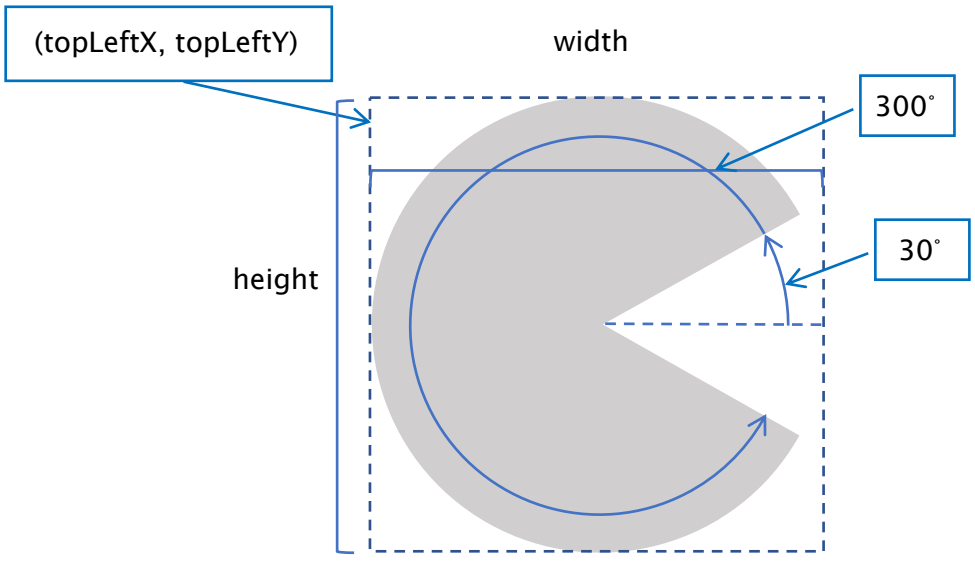

Figure 4. The blueprint of pacman

Figure 5 shows the outline of “Exercise4.java”.

Exercise4.java

```
1  /* Comment */
2
3  import java.awt.Color;
6
7  public class Exercise4 extends JFrame{
8
9      int[][] position = {{100, 90}, {250, 70}, {70, 180}, {200, 150}};
10     Color[] color = {Color.green, Color.red, Color.blue, Color.cyan};
11     int[] size = {60, 40, 90, 120};
12
13     public Exercise4() {
14         setSize(400,300);   // setting window size
15         setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
16         setVisible(true);
17     }
18
19     /***** paint *****/
20     public void paint(Graphics g){
21         for(int i = 0; i < position.length; i++) {
22
23             /* Complete this part */
24
25         }
26     }
27
28     public static void main(String[] args) {
29         new Exercise4();
30     }
31 }
```

Figure 5. The outline of “Exercise4.java”.

Exercise 5 (file name “Exercise5.java”)

Create Java program “Exercise5.java” which display a face as shown in Figure 6. Create a face in steps (a) to (f) using the following data.

```
int size = 200;
int centerX = 200;
int centerY = 150;
int eye = 50;
```

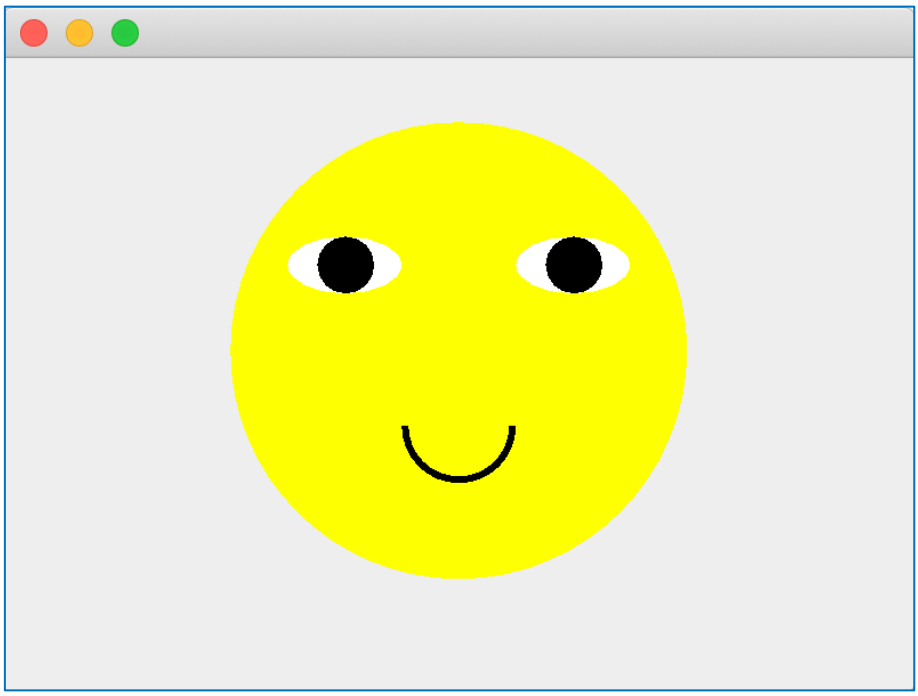

Figure 6. Face displayed in the program “Exercise5.java”.

(a) Draw a circle painted in yellow inscribed in a square with the upper left coordinates (centerX – size / 2, centerY –size / 2) and a width and height of “size” as shown in Figure 7.

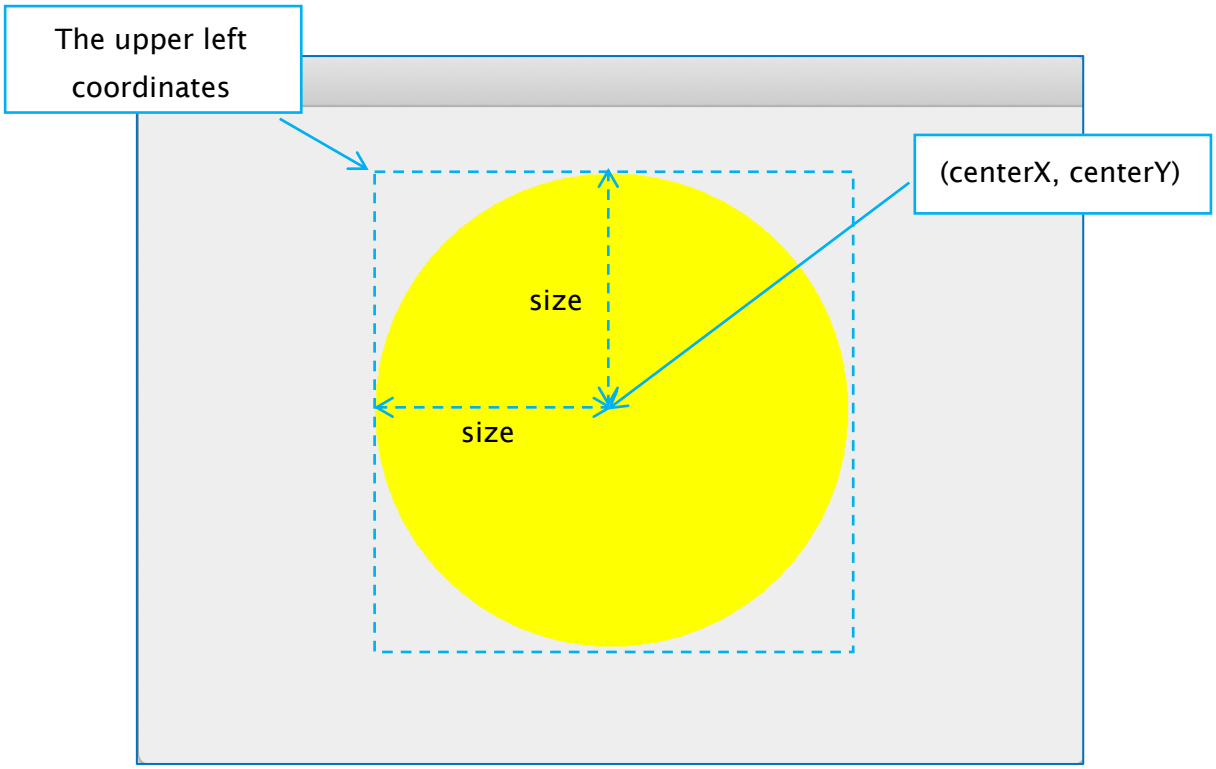

Figure 7. An entire face.

(b) In the case of the right eye, draw an ellipse painted in white, which is inscribed in a rectangular parallelepiped of width “eye” and vertical “eye / 2” whose upper left coordinates are (centerX – size / 4 – eye / 2, centerY – size / 8 – eye / 2) as shown in Figure 8. Draw a black-painted ellipse inscribed in the width and vertical “eye / 2” cubes whose upper left coordinates are (centerX – size / 4 – eye / 4, centerY – size / 8 – eye / 2). (See Figure 9)

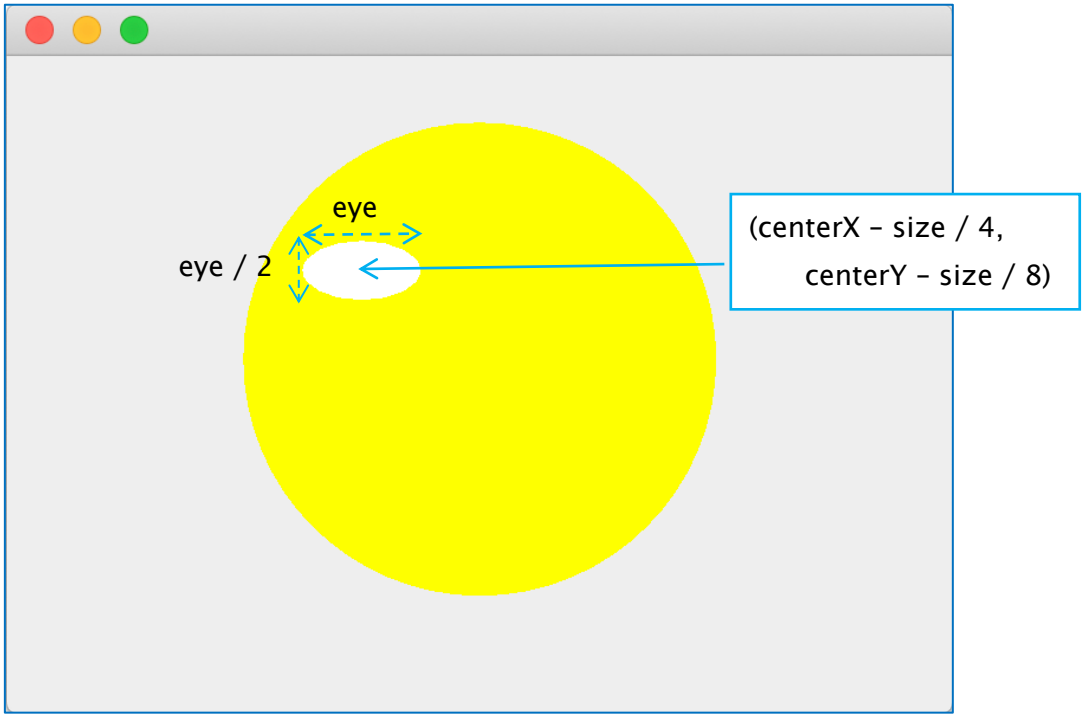

Figure 8. White part of the right eye.

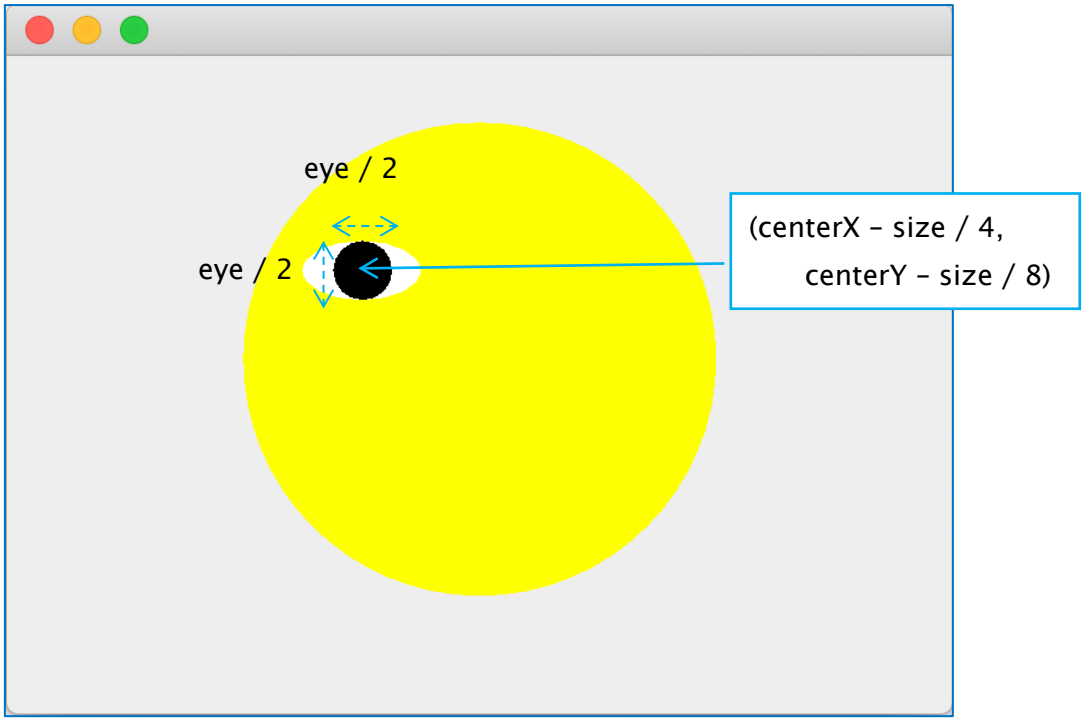

Figure 9. Black part of the right eye.

(c) Draw the left eye as in (b).

(d) Draw the mouth as follows.

(d-1) Draw a black semicircle with downward diameter eye as shown in Figure 10.

(d-2) Draw a yellow semicircle 6 pixels smaller as shown in Figure 11. Finally, a fan-shaped arc with a thickness of 3 pixels is drawn.

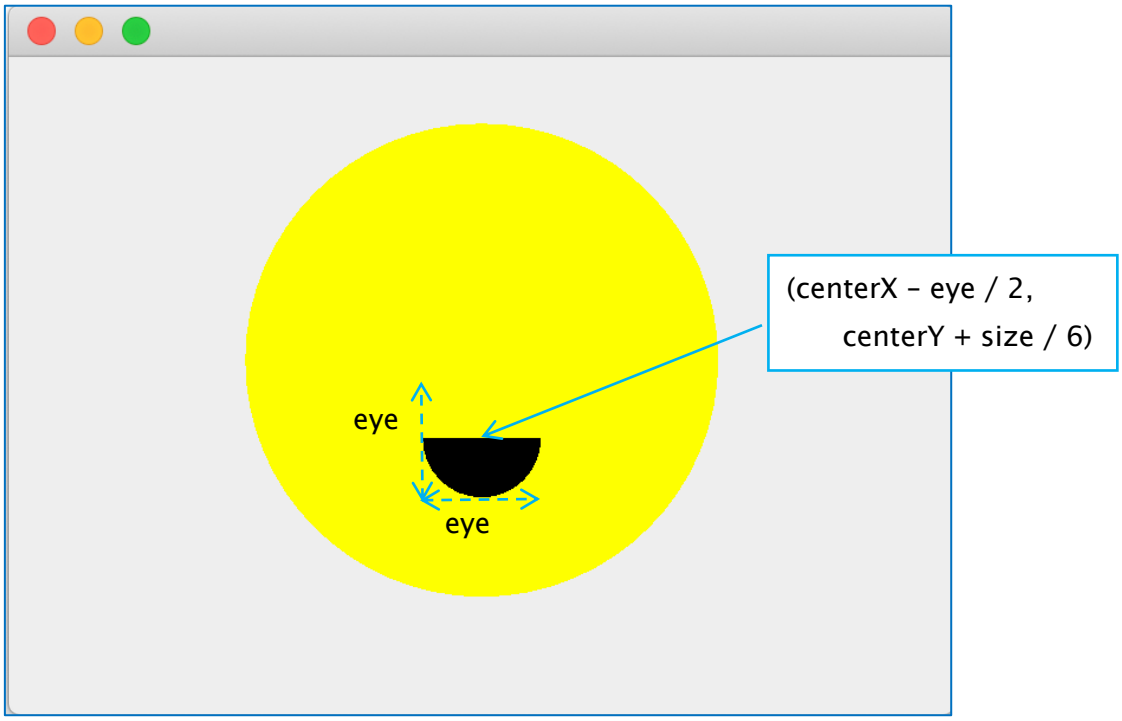

Figure 10. A black semicircle with downward diameter eye

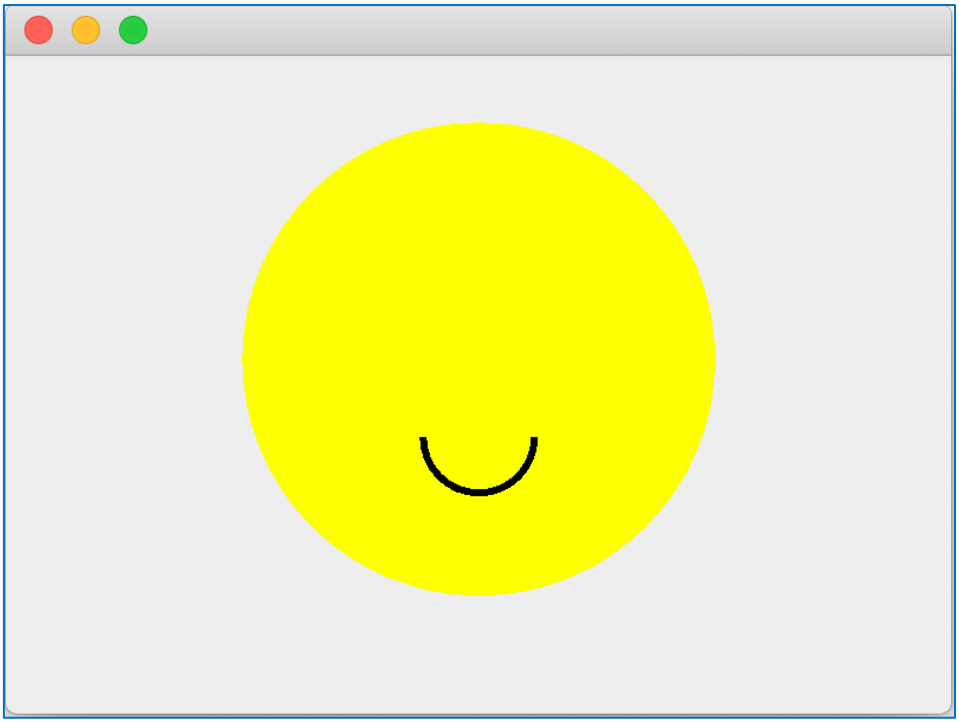

Figure 11. Completed mouth