

**15-112 Fall 2024 Quiz 5**

Up to 25 minutes. No calculators, no notes, no books, no computers. Show your work!  
Do not use lists, tuples, dictionaries, sets, try/except, or recursion on this quiz.

1. (6 points) **Code Tracing:**

```
def drawCT(app):
    a = app.width//4
    b = app.height//4
    drawRect(a, b, 3 * a, 3 * b, fill=None, border="black")
    drawCircle(a, b, a//2, align="bottom")
    drawLabel("ABC", 2*a, b, rotateAngle=-90, align="top")

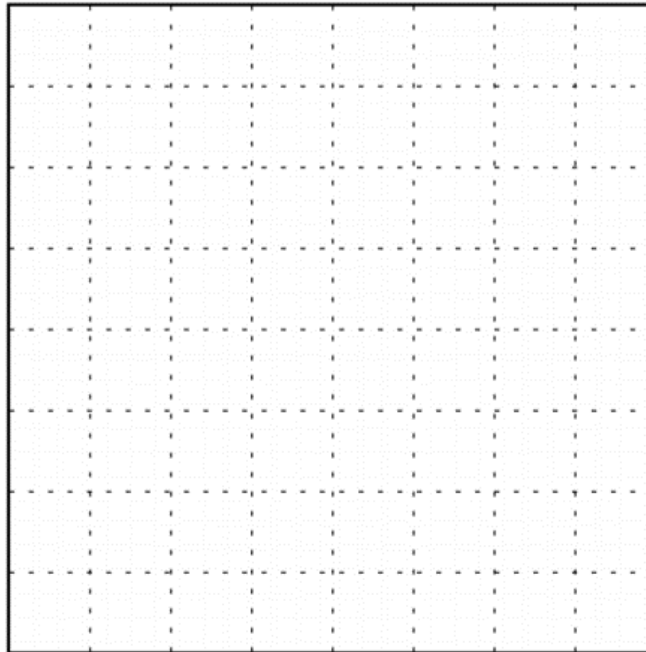
    cx = app.width//2 + 50
    cy = app.height//2 + 50
    w = 100
    h = 200
    for i in range(0, 2):
        drawOval(cx, cy, w, h, fill=None, border="black")
        w, h = h, w

def redrawAll(app):
    drawCT(app)
```

```
runApp(width=400, height=400)
```

Given that the box below is your canvas, with a width and height of 400 each, draw what the above code would display.

*Hint: Each of the small boxes on the canvas is 50x50 pixels.*

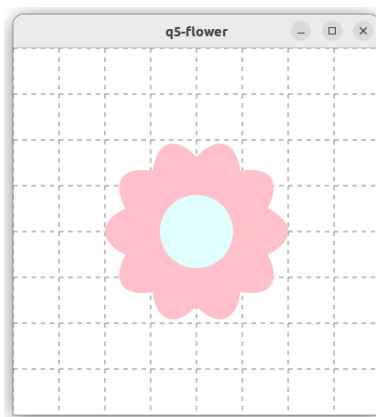


2. (7 points) **Code Modification: Fixing Scaling**

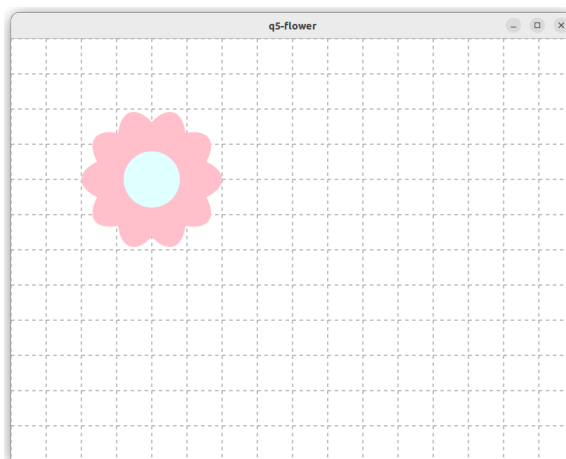
Consider the following:

```
def redrawAll(app):  
    rAngle = 0  
    angleDiff = 36  
  
    for i in range(5):  
        drawOval(200, 200, 200, 80, fill="pink", rotateAngle=rAngle, align="center")  
        rAngle += angleDiff  
  
    drawCircle(200, 200, 40, align="center", fill="lightCyan")  
  
runApp(width=400, height=400)
```

When this program is executed, the following picture is drawn (50 pixel grid lines are included for your benefit, but they are not in the actual picture):



There is a problem with this. When the width and height are changed, the flower no longer looks correct. For example, calling `runApp(width=800, height=600)` produces the following:



This isn't what we want. We would rather the flower be centered and scaled larger to accommodate the bigger canvas.

Write a new version of `redrawAll(app)` that properly centers and scales the flower at any reasonable width and height. At 400x400, the flower should look identical to how it does now.

Write your answer on the next page.

Here is the original code, for reference:

```
def redrawAll(app):  
    rAngle = 0  
    angleDiff = 36  
  
    for i in range(5):  
        drawOval(200, 200, 200, 80, fill="pink", rotateAngle=rAngle, align="center")  
        rAngle += angleDiff  
  
    drawCircle(200, 200, 40, align="center", fill="lightCyan")
```

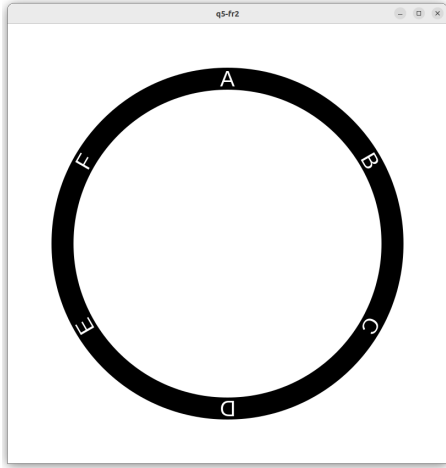
Your answer:

3. (7 points) **Free Response:** circularPrint

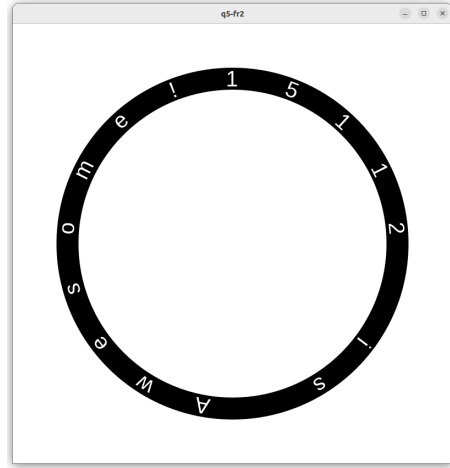
Write the function `circularPrint(app, s)`, which, given a string `s` displays all of the characters from that string in a clockwise circular pattern around a black ring.

For simplicity, you may assume that `app.width == app.height`.

Consider the following two examples:



`circularPrint(app, "ABCDEF")`



`circularPrint(app, "15112 is Awesome!")`