

15-112 Fall 2020 Quiz 2

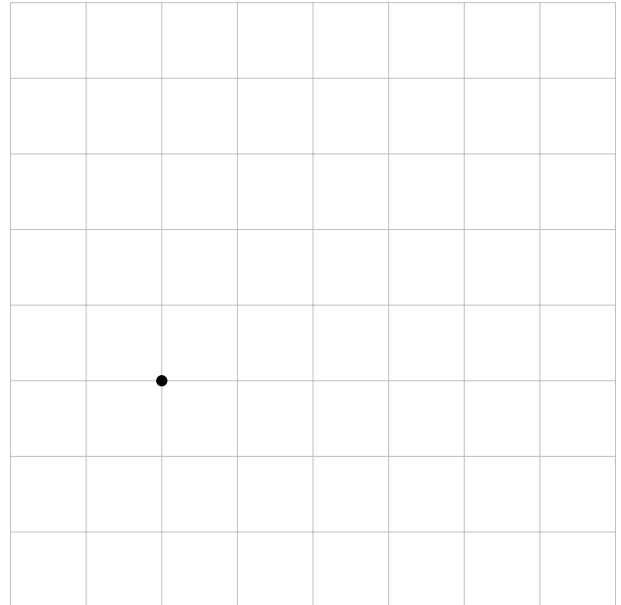
Up to 20 minutes. No calculators, no notes, no books, no computers. Show your work when relevant.

1. **Code Tracing:** Indicate what the following programs draw. Place your answer on the grid to the right of the code. You may assume that each square in the grid is 50 units wide and 50 units high. You may also assume that the turtle starts on the black dot, facing to the right. You may also assume that the code already has the statement from turtle import * at the top. (Note that the grid lines are provided for your reference. You may assume that they do not appear in the actual, final picture.)

(a) (2 points) CT1

```
def CT1():
    forward(50)
    left(90)
    forward(200)
    circle(50)
    forward(150)
    left(90)
    forward(275)
```

CT1()

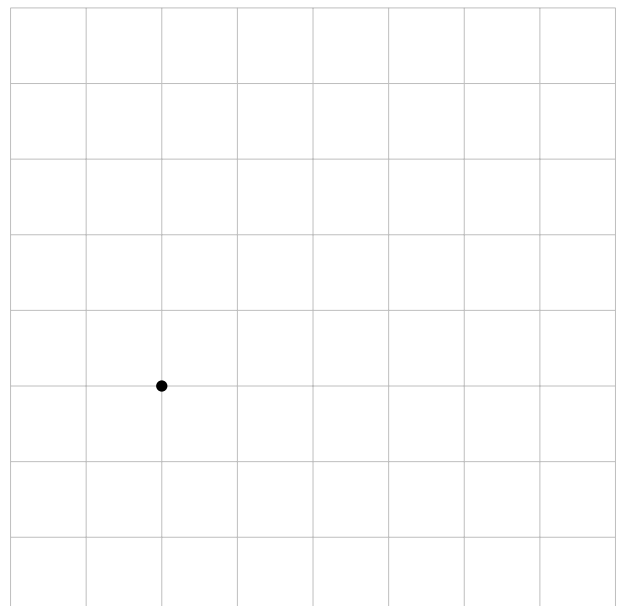


(b) (2 points) CT2

```
def func2():
    for i in range(4):
        forward(50)
        left(60)

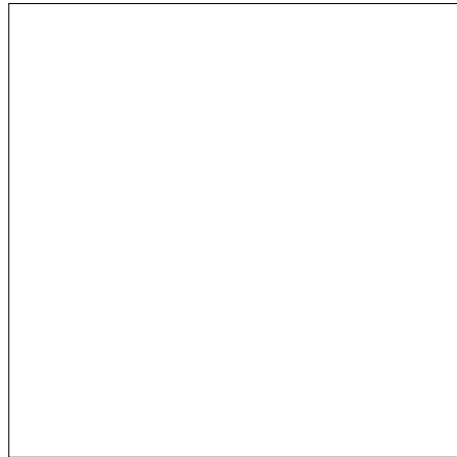
def CT2():
    forward(100)
    penup()
    forward(50)
    #right(60)
    pendown()
    for n in range(2):
        func2()
        forward(50)
        left(60)
        forward(50)
        left(60)
        forward(100)
```

CT2()



2. (3 points) **Code Tracing:** What would be the output printed on the screen, when the following code is executed:

```
def a(x):  
    print ("a1", x)  
    y = 2  
    x = x * y  
    y = 3  
    print ("a2", x, y)  
    return x + y  
  
def b(x):  
    for i in range(3):  
        x = x + x  
    return x  
  
z = b(2)  
print (a(z))
```



3. **Reasoning Over Code:** Consider the following function:

```
def roc1(n):  
    return (n+8)%6
```

- (a) (1 point) What is a value of n which, if passed to this function, will cause the function to return 1?
- (b) (1 point) What is the value of n which, if passed to this function, will cause the function to return the largest possible value?
- (c) (1 point) In general, for the formula $c = a \% b$, what is the largest possible value of c (as a function of a and/or b)? Explain your answer.