Name

You are *encouraged* to work together with other students, but you must turn in your own copy of your work. Try not to use a computer!

1. Here is a python program. What does it draw?

```
import turtle
                              100
def shape(x,y, size):
    t = turtle
    t.penup()
    t.goto(x,y)
    t.setheading(0)
    t.pendown()
    for i in range(4):
        t.forward(size)
        t.left(90)
        t.forward(size)
        t.left(90)
                               0
        t.forward(size)
        t.right(90)
height = 400
width = 400
turtle.setup (width, height)
t = turtle
t.penup()
t.setpos(0,0)
t.pendown()
for i in range(4):
    t.forward(30)
                              -100 l
                                -100
                                                                                  100
    t.left(90)
t.left(90)
for i in range(4):
    t.forward(60)
    t.left(90)
t.left(90)
for i in range(4):
    t.forward(90)
    t.left(90)
t.setpos(60, -60)
t.setpos(-60, -60)
t.setpos(0, 0)
t.begin fill()
t.fillcolor('black')
t.setpos(-60, 60)
t.setpos(-60, 0)
t.setpos(0, 0)
t.end_fill()
shape(-40, -70, 10)
```

Name

2. Write a python program that uses turtle graphics to draw the following figure. It consists of 10 rows of 'black' and 'gray' circles. The circles have radius 15, and the bottom-left circle begins at (x y) = (-150 - 150).

```
import turtle
height = 400
width = 400
turtle.setup(width,height)
t = turtle
```

Here are some useful turtle methods:

```
goto(10, 20)
                          Moves the pen to position (10, 20)
forward(100)
                          Moves the pen forward 100 units
                          'forward' is now up (0 = right, 90 = up, 180 = left, 270 = down)
setheading(90)
                          rotates the heading 90 degrees to the right
right(90)
left(90)
                          rotates the heading 90 degrees to the left
                          Pen movement won't do any drawing
penup()
pendown()
                          Pen movement will draw something
color('red')
                          Lines will be drawn red, from here on
pensize(5)
                          Lines be drawn 5 pixels thick, from here on
                          Start a filled polygon
begin_fill()
end fill()
                          Finish a filled polygon
fillcolor('yellow') Polygons will be filled with yellow pixels
```