BIS 420 PROGRAMMING FOR DATA SCIENCE

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CHAPTER 4 EXERCISE 4.3
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Write an appropriately general set of functions that can draw shapes as in Figure 4.2.

Solution: http: // thinkpython. com/ code/ pie. py .

```python
from __future__ import print_function, division


import math

import turtle



def draw_pie(t, n, r):

    polypie(t, n, r)

    t.pu()

    t.fd(r*2 + 10)

    t.pd()



def polypie(t, n, r):

    angle = 360.0 / n

    for i in range(n):

        isosceles(t, r, angle/2)

        t.lt(angle)
```

```python
def isosceles(t, r, angle):
    y = r * math.sin(angle * math.pi / 180)

    t.rt(angle)
    t.fd(r)
    t.lt(90+angle)
    t.fd(2*y)
    t.lt(90+angle)
    t.fd(r)
    t.lt(180-angle)


bob = turtle.Turtle()

bob.pu()
bob.bk(130)
bob.pd()

size = 40
draw_pie(bob, 5, size)
draw_pie(bob, 6, size)
draw_pie(bob, 7, size)
draw_pie(bob, 8, size)

bob.hideturtle()
turtle.mainloop()
```

```python
from __future__ import print_function, division

import math
import turtle


def draw_pie(t, n, r):
    polypie(t, n, r)
    t.pu()
    t.fd(r*2 + 10)
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def polypie(t, n, r):
    angle = 360.0 / n
    for i in range(n):
        isosceles(t, r, angle/2)
        t.lt(angle)


def isosceles(t, r, angle):
    y = r * math.sin(angle * math.pi / 180)

    t.rt(angle)
    t.fd(r)
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