

**BIS 420 PROGRAMMING FOR DATA SCIENCE**  
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**CHAPTER 5 EXERCISE 5.5**  
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Read the following function and see if you can figure out what it does. Then run it  
(see the examples in Chapter 4)

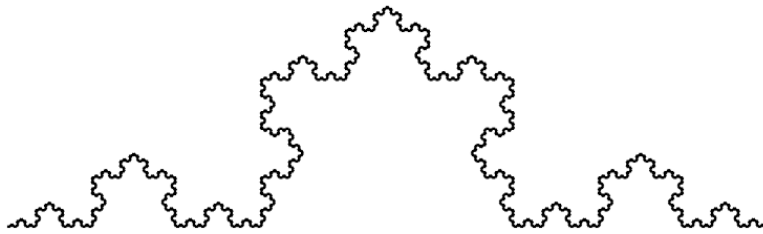


Figure 5.2: A Koch curve.

```
def draw(t, length, n):  
    if n == 0:  
        return  
    angle = 50  
    fd(t, length*n)  
    lt(t, angle)  
    draw(t, length, n-1)  
    rt(t, 2*angle)  
    draw(t, length, n-1)  
    lt(t, angle)  
    bk(t, length*n)
```

**Ans:**

```
import turtle
```

```
def koch_curve(t, length, n):
```

```
    if n == 0:
```

```
        t.forward(length)
```

```
    else:
```

```
        length /= 3.0
```

```
        koch_curve(t, length, n - 1)
```

```
        t.left(60)
```

```
        koch_curve(t, length, n - 1)
```

```
        t.right(120)
```

```
        koch_curve(t, length, n - 1)
```

```
        t.left(60)
```

```
        koch_curve(t, length, n - 1)
```

```
def draw_koch_curve(order, size):
```

```
    screen = turtle.Screen()
```

```
    screen.bgcolor("white")
```

```
    t = turtle.Turtle()
```

```
    t.speed(0)
```

```
    t.penup()
```

```
    t.goto(-size // 2, 0)
```

```
    t.pendown()
```

```
koch_curve(t, size, order)
```

```
screen.mainloop()
```

```
draw_koch_curve(4, 300)
```

```
1  import turtle
2
3  def koch_curve(t, length, n):
4      if n == 0:
5          t.forward(length)
6      else:
7          length /= 3.0
8          koch_curve(t, length, n - 1)
9          t.left(60)
10         koch_curve(t, length, n - 1)
11         t.right(120)
12         koch_curve(t, length, n - 1)
13         t.left(60)
14         koch_curve(t, length, n - 1)
15
16  def draw_koch_curve(order, size):
17      screen = turtle.Screen()
18      screen.bgcolor("white")
19
20      t = turtle.Turtle()
21      t.speed(0)
22
23      t.penup()
24      t.goto(-size // 2, 0)
25      t.pendown()
26
27      koch_curve(t, size, order)
28
29      screen.mainloop()
30
31  draw_koch_curve(4, 300)
32
```