

# python

The Python logo, consisting of two interlocking snakes, one blue and one yellow, is positioned below the word "python".

```
import turtle
turtle.setup(650,350,200,200)
turtle.penup()
turtle.fd(-250)
turtle.pendown()
turtle.pensize(25)
turtle.pencolor("purple")

for i in range(4):
    turtle.circle(40, 80)
    turtle.circle(-40, 80)
    turtle.fd(40)
    turtle.circle(16, 180)
    turtle.fd(40 * 2/3)
```

## 实例7: 七段数码管绘制

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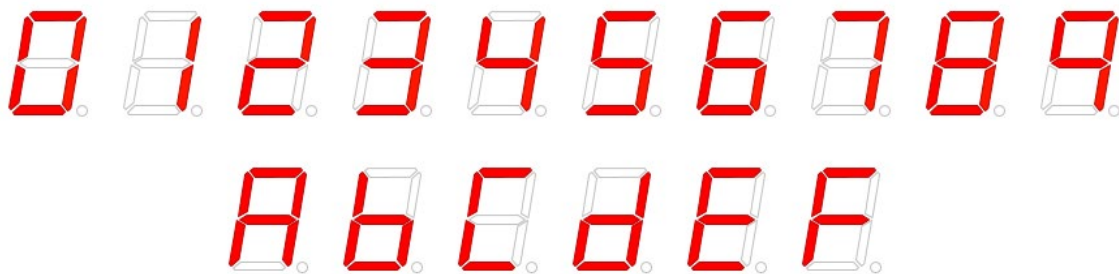
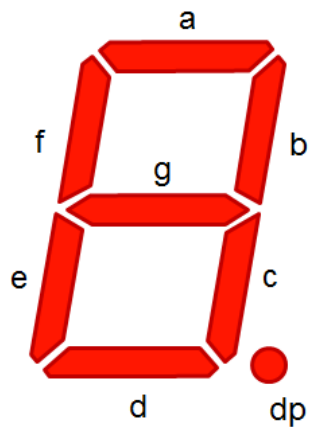




# "七段数码管绘制"问题分析

# 问题分析

## 七段数码管



# 问题分析

## 七段数码管绘制

- 需求：用程序绘制七段数码管，似乎很有趣
- 该怎么做呢？

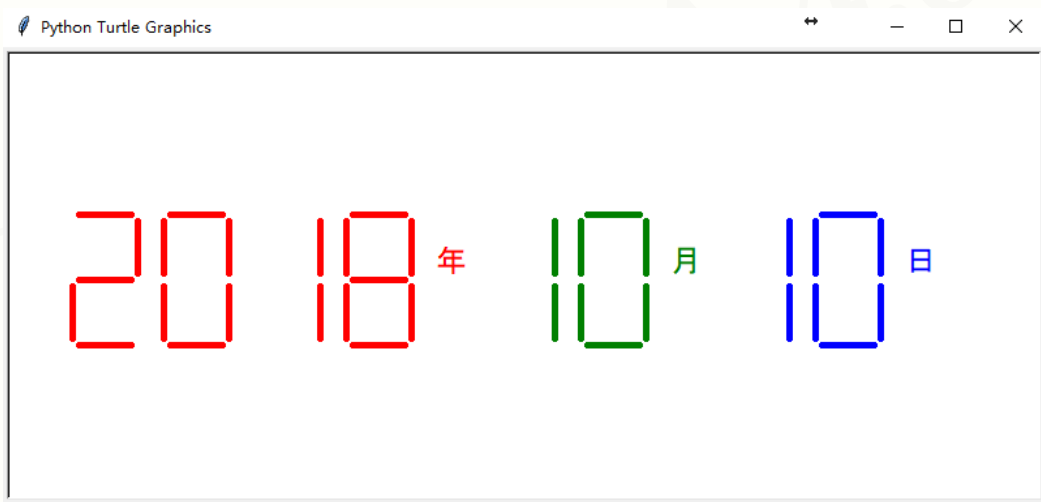
turtle绘图体系



七段数码管绘制

# 问题分析

## 七段数码管绘制时间





# "七段数码管绘制"实例讲解(上)

# 七段数码管绘制

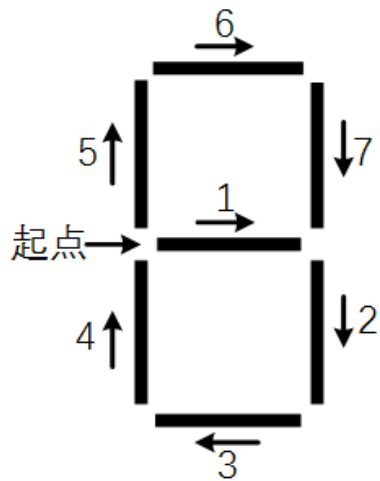
## 基本思路

- **步骤1：绘制单个数字对应的数码管**
- **步骤2：获得一串数字，绘制对应的数码管**
- **步骤3：获得当前系统时间，绘制对应的数码管**



# 七段数码管绘制

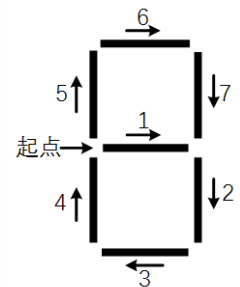
## 步骤1: 绘制单个数码管



- 七段数码管由7个基本线条组成
- 七段数码管可以有固定顺序
- 不同数字显示不同的线条

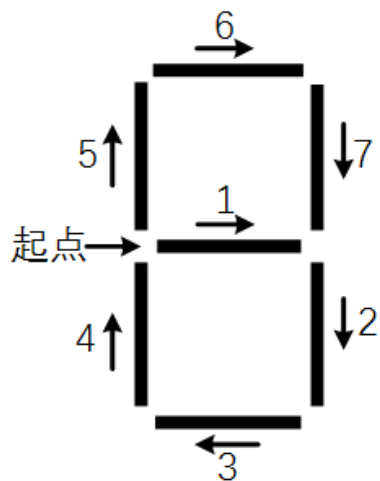
```
import turtle
def drawLine(draw):    #绘制单段数码管
    turtle.pendown() if draw else turtle.penup()
    turtle.fd(40)
    turtle.right(90)
```

```
def drawDigit(digit): #根据数字绘制七段数码管
    drawLine(True) if digit in [2,3,4,5,6,8,9] else drawLine(False)
    drawLine(True) if digit in [0,1,3,4,5,6,7,8,9] else drawLine(False)
    drawLine(True) if digit in [0,2,3,5,6,8,9] else drawLine(False)
    drawLine(True) if digit in [0,2,6,8] else drawLine(False)
    turtle.left(90)
    drawLine(True) if digit in [0,4,5,6,8,9] else drawLine(False)
    drawLine(True) if digit in [0,2,3,5,6,7,8,9] else drawLine(False)
    drawLine(True) if digit in [0,1,2,3,4,7,8,9] else drawLine(False)
    turtle.left(180)
    turtle.penup() #为绘制后续数字确定位置
    turtle.fd(20)  #为绘制后续数字确定位置
```

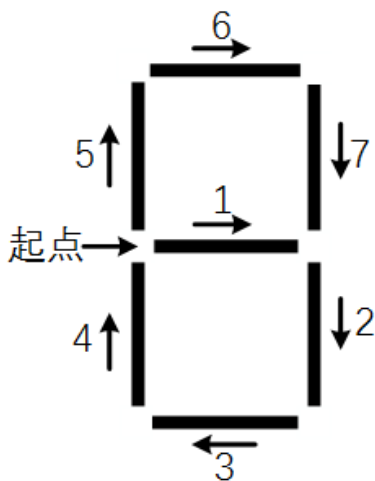


# 七段数码管绘制

步骤2: 获取一段数字，绘制多个数码管

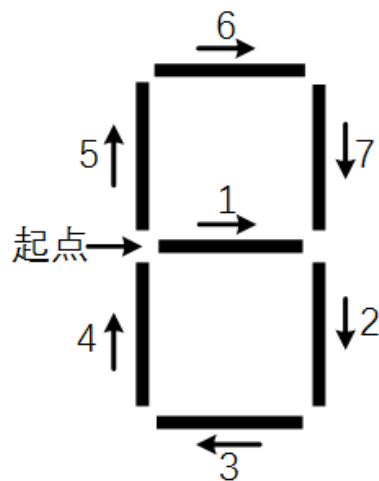


第1个



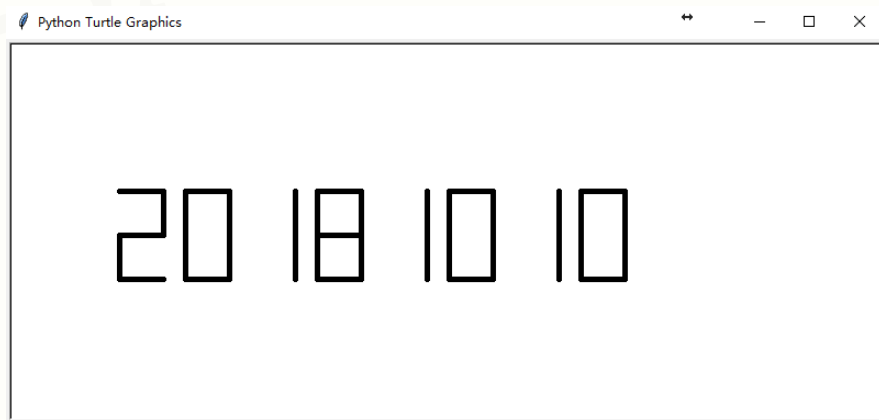
第2个

...



第N个

```
import turtle
def drawLine(draw):    #绘制单段数码管
    ... (略)
def drawDigit(digit):  #根据数字绘制七段数码管
    ... (略)
def drawDate(date):    #获得要输出的数字
    for i in date:
        drawDigit(eval(i))    #通过eval()函数将数字变为整数
def main():
    turtle.setup(800, 350, 200, 200)
    turtle.penup()
    turtle.fd(-300)
    turtle.pensize(5)
    drawDate('20181010')
    turtle.hideturtle()
    turtle.done()
main()
```



**准备好电脑，与老师一起编码吧！**



# "七段数码管绘制"实例讲解(下)

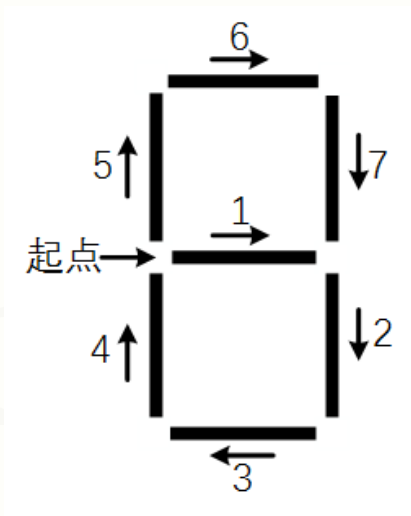
# 七段数码管绘制

## 基本思路

- 步骤1：绘制单个数字对应的数码管
- 步骤2：获得一串数字，绘制对应的数码管
- 步骤3：获得当前系统时间，绘制对应的数码管

# 七段数码管绘制

## 绘制漂亮的七段数码管



- 增加七段数码管之间线条间隔



```
import turtle
```

```
def drawGap():    #绘制数码管间隔
```

```
    turtle.penup()
```

```
    turtle.fd(5)
```

```
def drawLine(draw):    #绘制单段数码管
```

```
    drawGap()
```

```
    turtle.pendown() if draw else turtle.penup()
```

```
    turtle.fd(40)
```

```
    drawGap()
```

```
    turtle.right(90)
```

```
def drawDigit(digit):    #根据数字绘制七段数码管
```

```
    drawLine(True) if digit in [2,3,4,5,6,8,9] else drawLine(False)
```

```
    drawLine(True) if digit in [0,1,3,4,5,6,7,8,9] else drawLine(False)
```

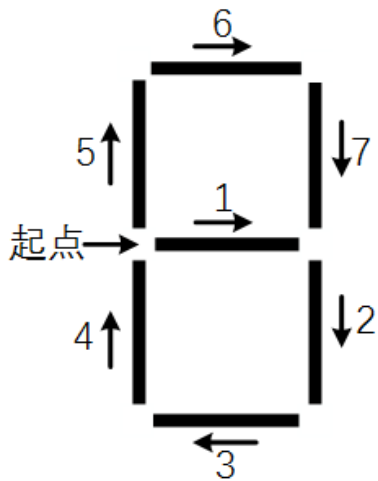
```
    drawLine(True) if digit in [0,2,3,5,6,8,9] else drawLine(False)
```

```
    drawLine(True) if digit in [0,2,6,8] else drawLine(False)
```

```
    ... (略)
```

# 七段数码管绘制

## 步骤3: 获取系统时间, 绘制七段数码管



- 使用time库获得系统当前时间
- 增加年月日标记
- 年月日颜色不同

```
import turtle, time
...(略)
def drawDate(date):    #data为日期, 格式为 '%Y-%m=%d+'
    turtle.pencolor("red")
    for i in date:
        if i == '-':
            turtle.write('年', font=("Arial", 18, "normal"))
            turtle.pencolor("green")
            turtle.fd(40)
        elif i == '=':
            turtle.write('月', font=("Arial", 18, "normal"))
            turtle.pencolor("blue")
            turtle.fd(40)
        elif i == '+':
            turtle.write('日', font=("Arial", 18, "normal"))
        else:
            drawDigit(eval(i))

def main():
...(略)
```

```
import turtle, time
```

```
...(略)
```

```
def drawDate(date):
```

```
...(略)
```

```
def main():
```

```
    turtle.setup(800, 350, 200, 200)
```

```
    turtle.penup()
```

```
    turtle.fd(-300)
```

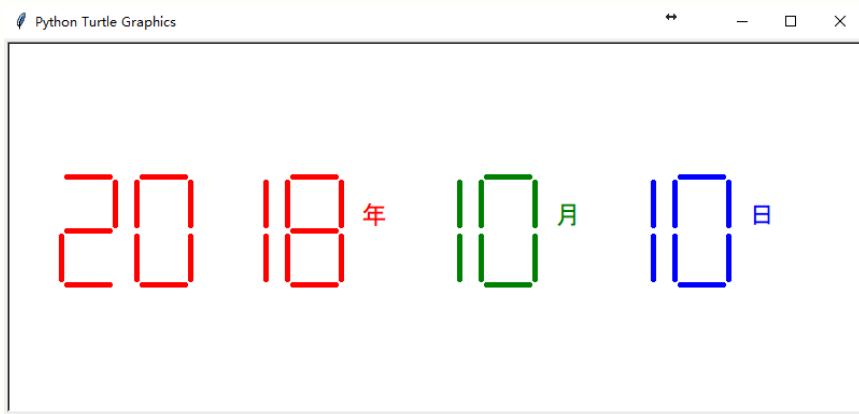
```
    turtle.pensize(5)
```

```
    drawDate(time.strftime('%Y-%m=%d+', time.gmtime()))
```

```
    turtle.hideturtle()
```

```
    turtle.done()
```

```
main()
```



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# "七段数码管绘制"举一反三



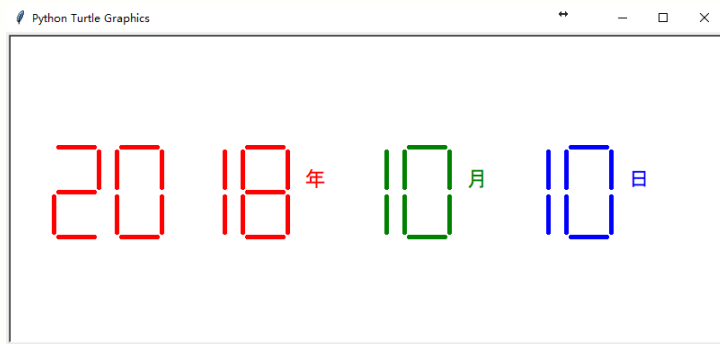
```
import turtle, time
```

```
...(略)
```

```
def drawLine(draw):  
    drawGap()  
    turtle.pendown() if draw else turtle.penup()  
    turtle.fd(40)  
    drawGap()  
    turtle.right(90)
```

```
def drawDigit(digit):  
    drawLine(True) if digit in [2,3,4,5,6,8,9] else drawLine(False)  
    drawLine(True) if digit in [0,1,3,4,5,6,7,8,9] else drawLine(False)  
    drawLine(True) if digit in [0,2,3,5,6,8,9] else drawLine(False)  
    drawLine(True) if digit in [0,2,6,8] else drawLine(False)  
    turtle.left(90)  
    drawLine(True) if digit in [0,4,5,6,8,9] else drawLine(False)  
    drawLine(True) if digit in [0,2,3,5,6,7,8,9] else drawLine(False)  
    drawLine(True) if digit in [0,1,2,3,4,7,8,9] else drawLine(False)
```

```
...(略)
```



# 举一反三

## 理解方法思维

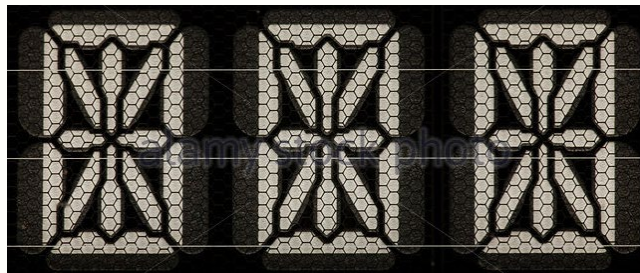
- **模块化思维：确定模块接口，封装功能**
- **规则化思维：抽象过程为规则，计算机自动执行**
- **化繁为简：将大功能变为小功能组合，分而治之**



# 举一反三

## 应用问题的扩展

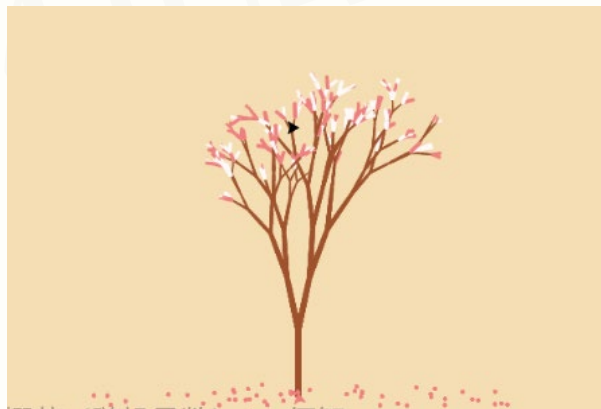
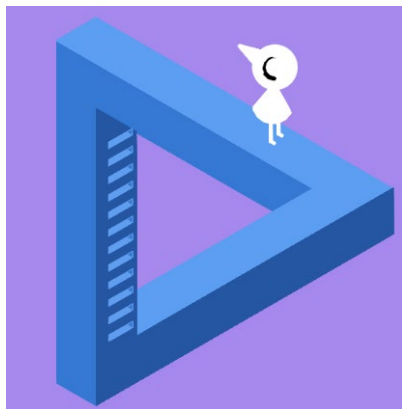
- 绘制带小数点的七段数码管
- 带刷新的时间倒计时效果
- 绘制高级的数码管





# 小花絮

## 小惊喜：这些图像都是Python海龟的作品



更多作品请参考：[https://python123.io/index/turtle\\_drawing](https://python123.io/index/turtle_drawing)



