

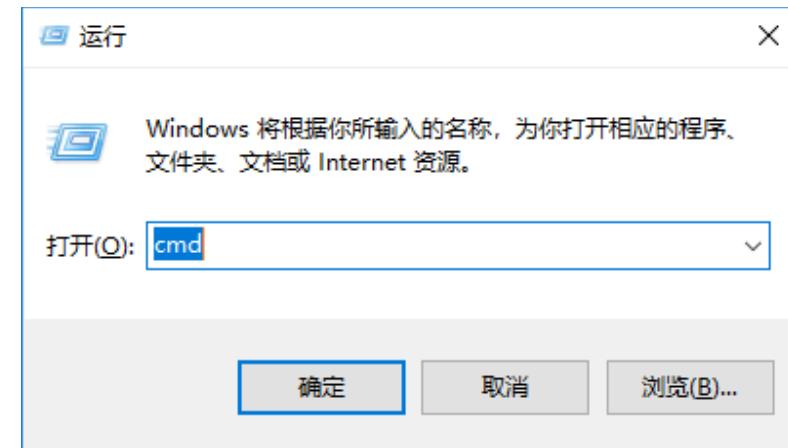
# Python库

## Matplotlib画图

清华大学iCenter

# 安装使用Matplotlib

- Windows的命令行(CMD)打开方式
  - 方法一：按下Win + R 键，弹出运行窗口，输入“cmd”后点击确定。
  - 方法二：在电脑左下角的搜索框搜索“cmd”或“命令提示符”，点击检索结果“命令提示符”。
  - 方法三：打开“开始”，点击“运行”，弹出运行窗口，输入“cmd”后点击确定。
  - 输入 **pip install matplotlib**
- MacOS的终端（Terminal）打开方式
  - 搜索terminal应用（自带）
  - 输入 **pip install matplotlib**



# Matplotlib画图

散点图 (Scatter plot)

线图 (Line plot)

柱状图 (Bar plot)

3D图 (3D plot)



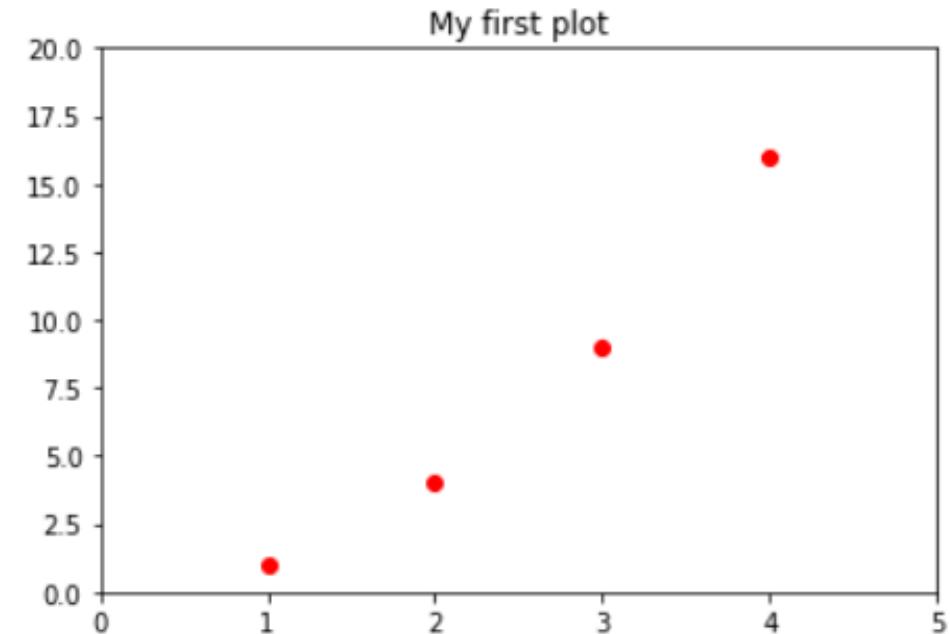
<https://matplotlib.org>

# 散点图示例 (Scatter plot)

- 设置绘图的属性，每个点(x,y)用红点表示

```
plt.axis([0,5,0,20])
plt.title('My first plot')
plt.plot([1,2,3,4],[1,4,9,16], 'ro')
```

```
[<matplotlib.lines.Line2D at 0x22671f83048>]
```



# 散点图示例 (Scatter plot)

Import

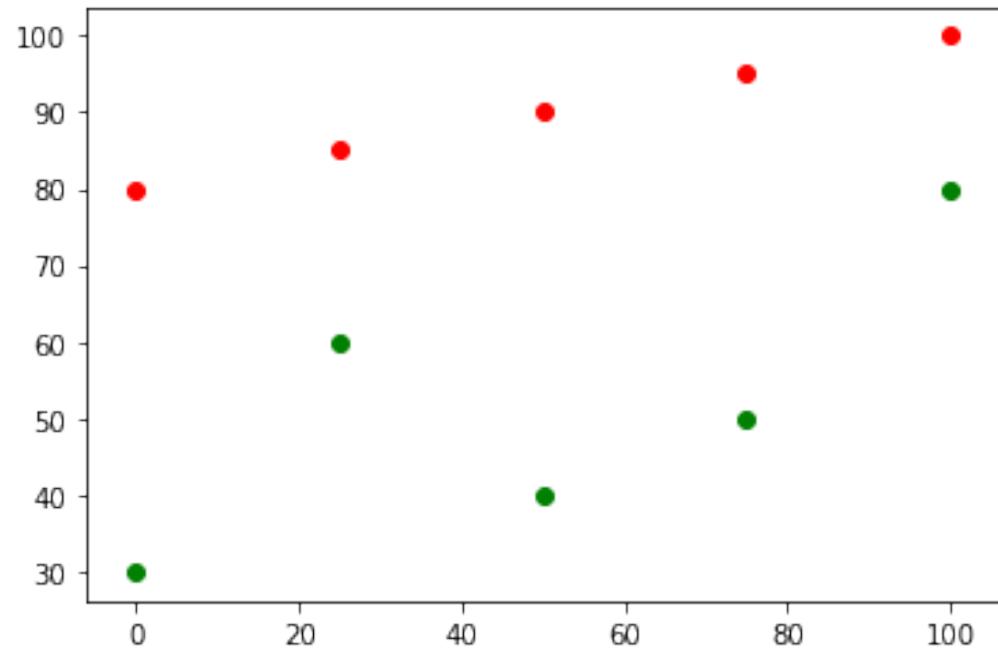
```
import matplotlib.pyplot as plt
```

Create data

```
classA_grades = [80,85,90,95,100]  
classB_grades = [30,60,40,50,80]  
grades_range = [0,25, 50,75,100]
```

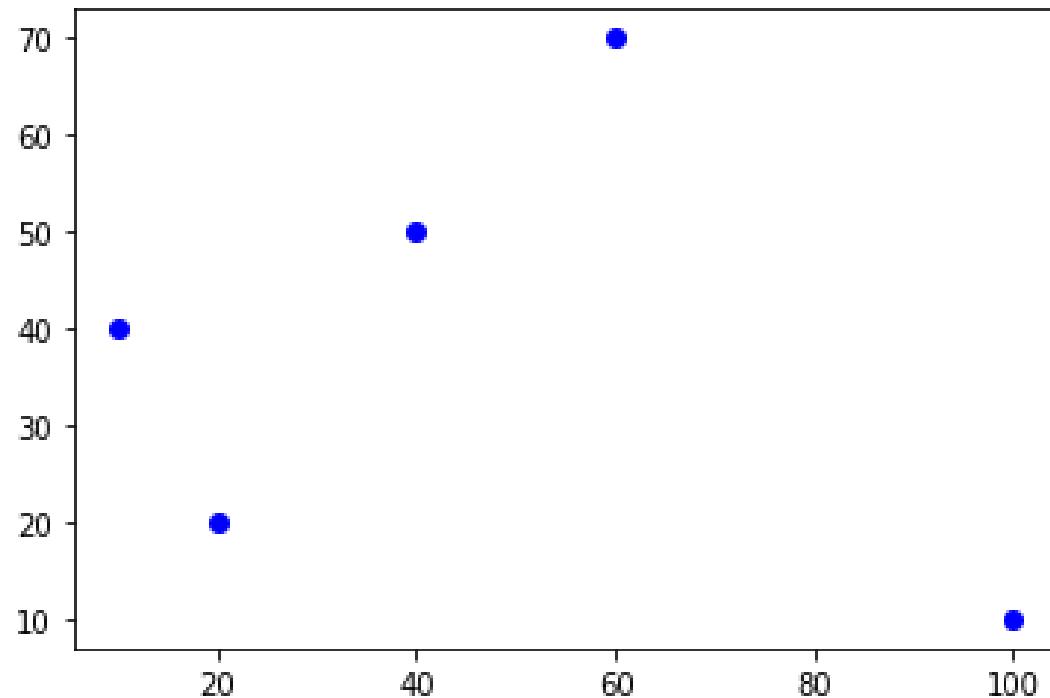
Plotting

```
plt.plot( grades_range, classA_grades, 'ro')  
plt.plot( grades_range, classB_grades, 'go')
```



# 想一想，练一练

- 绘制一组散点图，颜色为蓝色
  - 纵坐标为 40, 20, 50, 70, 10
  - 横坐标为 10, 20, 40, 60, 100



# 线图画图示例

Import

```
import matplotlib.pyplot as plt  
from matplotlib.font_manager import FontProperties  
import numpy as np
```

Create data

```
t = np.arange(0.0, 2.0, 0.01)  
s = 1 + np.sin(2 * np.pi * t)
```

Plotting

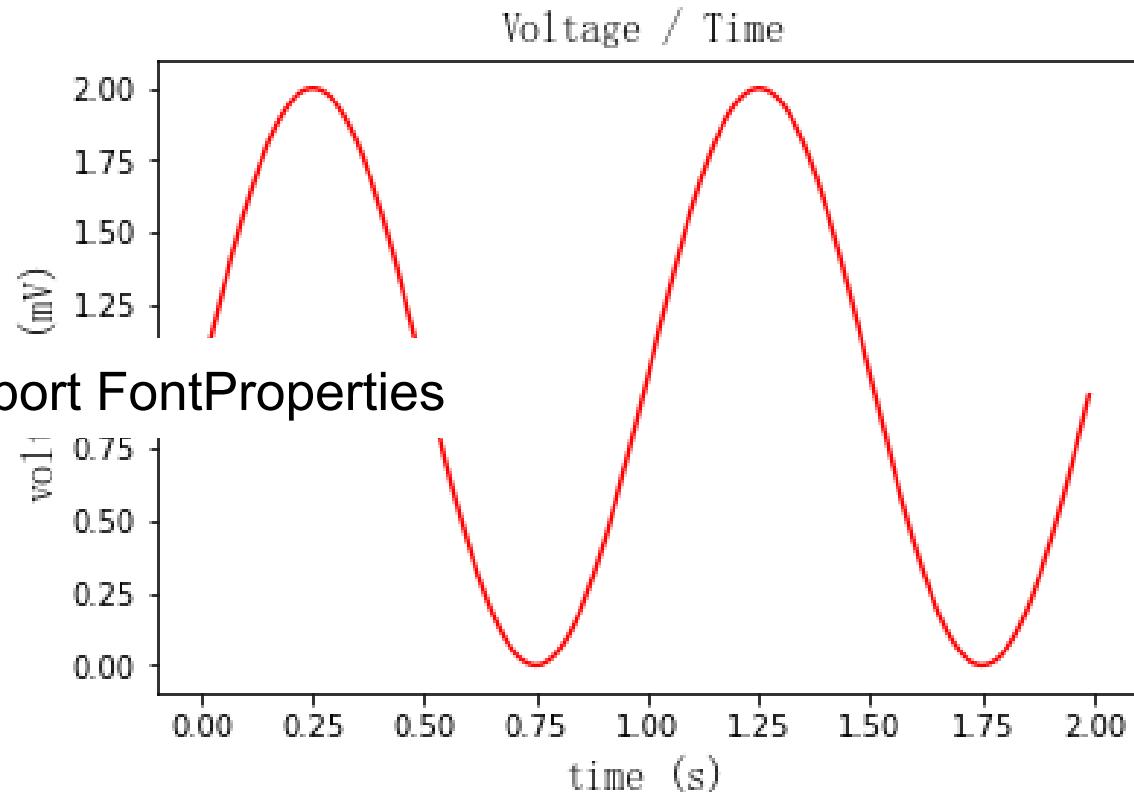
```
plt.plot( t , s , 'r' )
```

Format plot

```
font = FontProperties(fname=r"c:\windows\fonts\SimSun.ttf", size=14)  
plt.title(u'Voltage / Time', fontproperties=font)  
plt.xlabel(u'time (s)', fontproperties=font)  
plt.ylabel(u'veloltage (mV)', fontproperties=font)
```

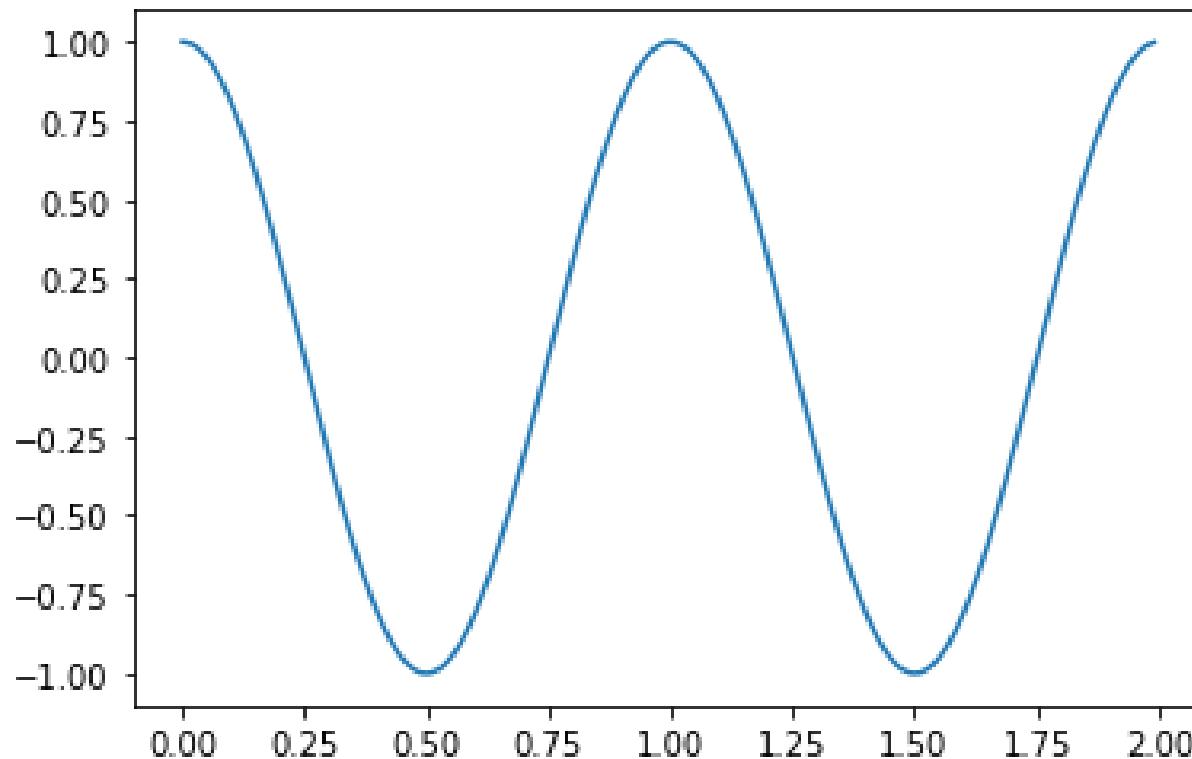
Save

```
plt.savefig("test.png")
```



# 练一练

- 绘制一个蓝色曲线余弦函数的线图



# 一图多条线

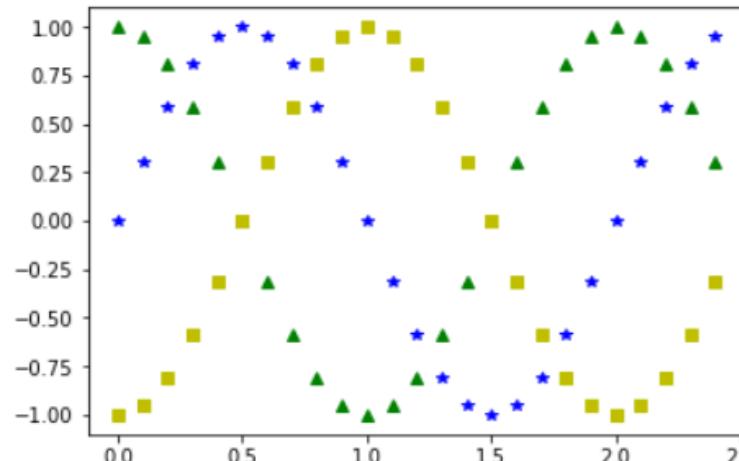
- 点线的颜色 : g | green ; b | blue ; c | cyan 蓝绿色 ; m - magenta 品红色
- 点的形状 : . | 点 ; v | 实心倒三角 ; ^ | 实心三角 ; o | 实心圆 ; \* | 实心五角星 ; + | 加号 ; s | 实心方块
- 线的形状 : - | 实线 ; -- | 虚线 ; - . | 点划线

- 一张图中画出三种图，以sin函数为例

```
import math
import numpy as np

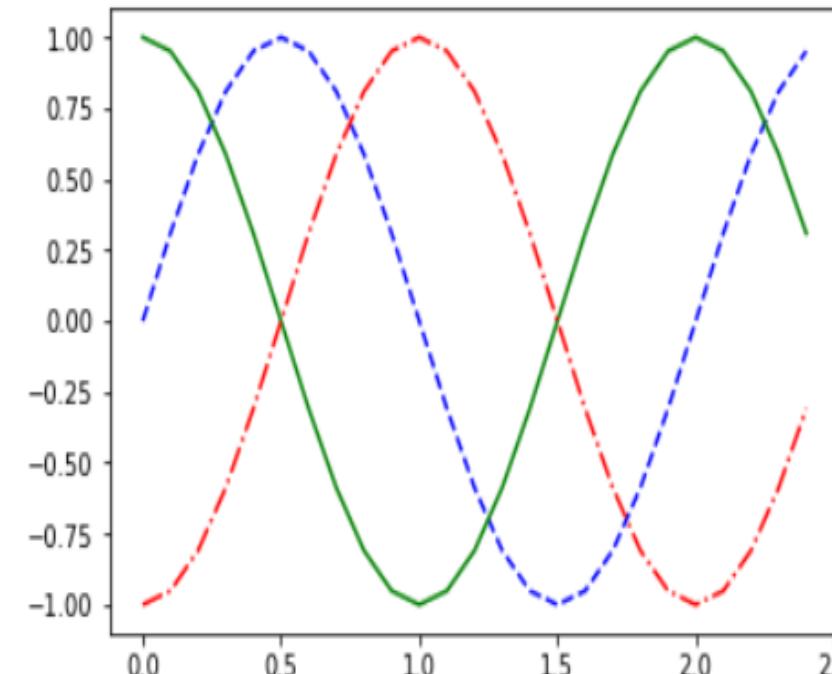
t = np.arange(0,2.5,0.1)
y1 = np.sin(math.pi*t)
y2 = np.sin(math.pi*t+math.pi/2)
y3 = np.sin(math.pi*t-math.pi/2)
plt.plot(t,y1,'b*',t,y2,'g^',t,y3,'r+')
```

```
[<matplotlib.lines.Line2D at 0x226720852b0>,
<matplotlib.lines.Line2D at 0x226720854e0>,
<matplotlib.lines.Line2D at 0x226720857f0>]
```



```
plt.plot(t,y1,'b--',t,y2,'g',t,y3,'r-.')
```

```
[<matplotlib.lines.Line2D at 0x226720eba90>,
<matplotlib.lines.Line2D at 0x226720ebbe0>,
<matplotlib.lines.Line2D at 0x226720ebf60>]
```



# Subplot绘制子图

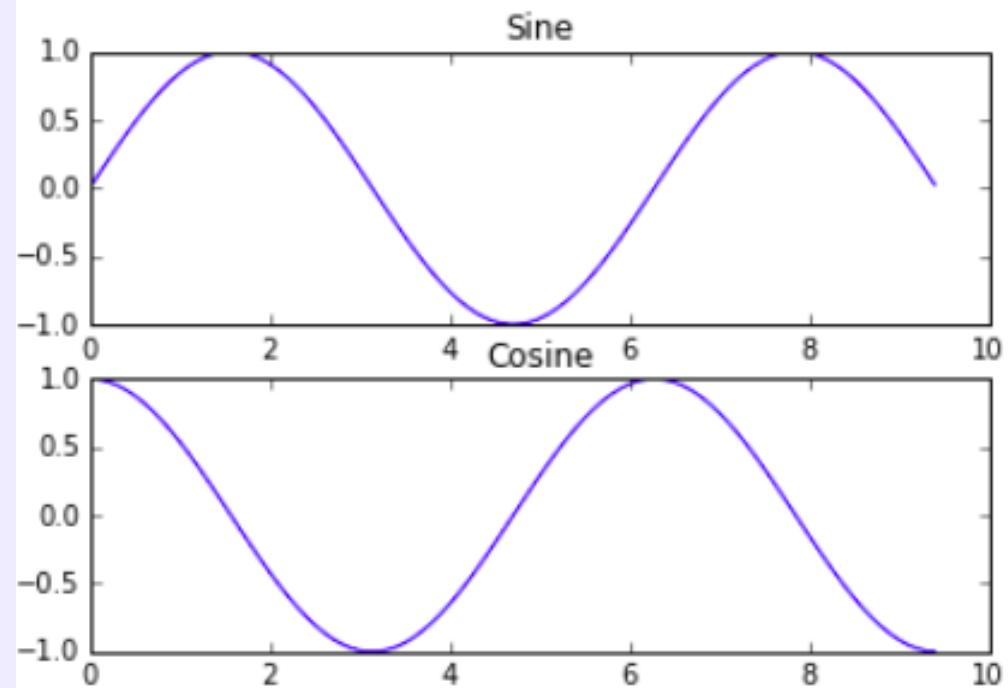
```
x = np.arange(0, 3 * np.pi, 0.1)
y_sin = np.sin(x)
y_cos = np.cos(x)

# Set up a subplot grid that has height 2 and width 1,
# and set the first such subplot as active.
plt.subplot(2, 1, 1)

# Make the first plot
plt.plot(x, y_sin)
plt.title('Sine')

# Set the second subplot as active, and make the second plot.
plt.subplot(2, 1, 2)
plt.plot(x, y_cos)
plt.title('Cosine')

# Show the figure.
plt.show()
```

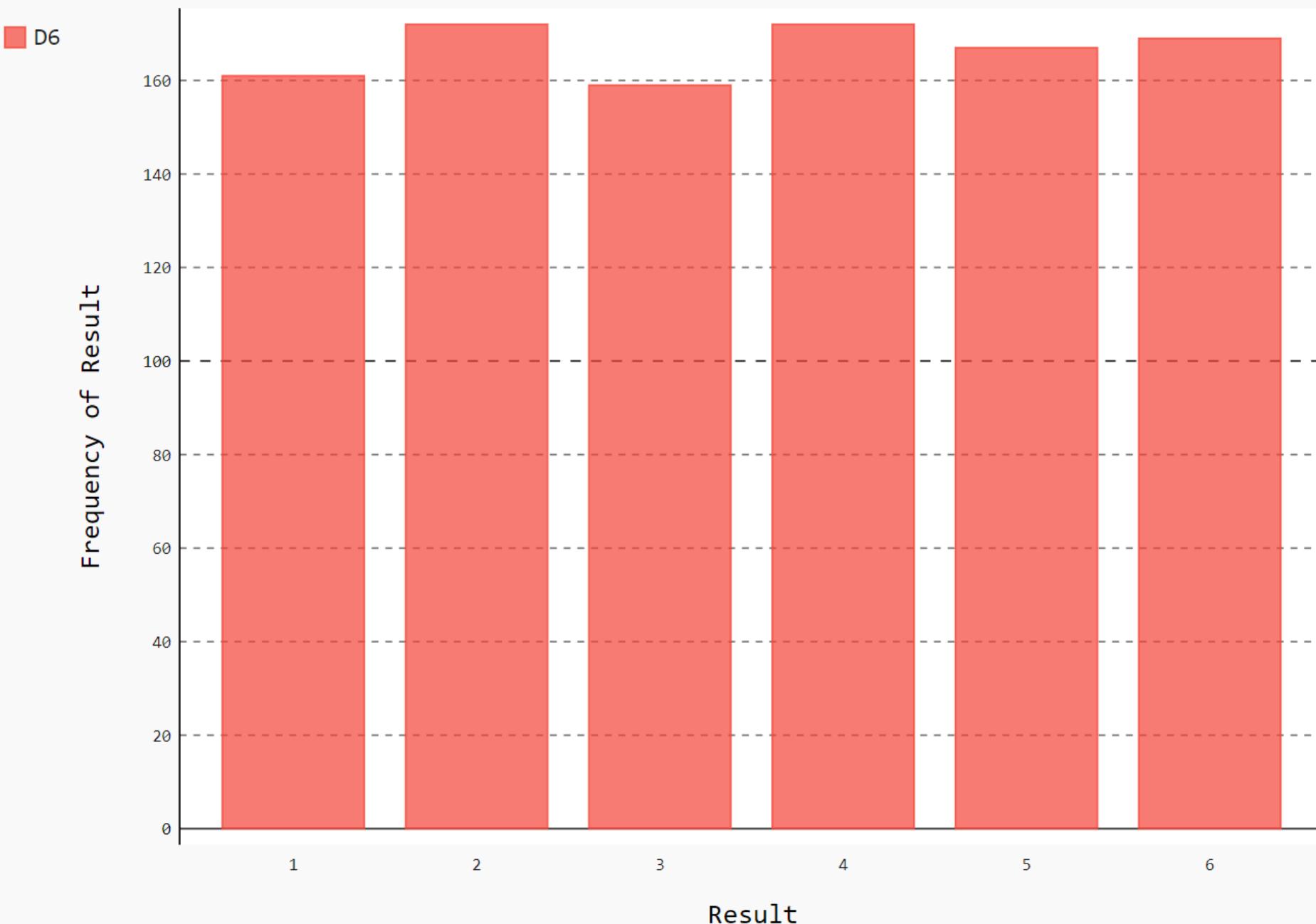


# Pygal

# pygal

- Python画廊
- pygal(<http://www.pygal.org>)
- pip install pygal

Result of rolling one D6 1000 times.



# 想一想，练一练

## 掷骰子结果可视化

```
from random import randint
results = []
for roll_num in range(1000):
    result = randint(1,6)
    results.append(result)

frequencies = []
for value in range(1,7):
    frequency = results.count(value)
    frequencies.append(frequency)
```

# pygal

```
import pygal

hist = pygal.Bar()
hist.title = 'Result of rolling one D6 1000 times.'
hist.x_labels = ['1','2','3','4','5','6']
hist.x_title = 'Result'
hist.y_title = 'Frequency of Result'
hist.add('D6',frequencies)
hist.render_to_file('Desktop/visual.svg')
```

谢谢指正！