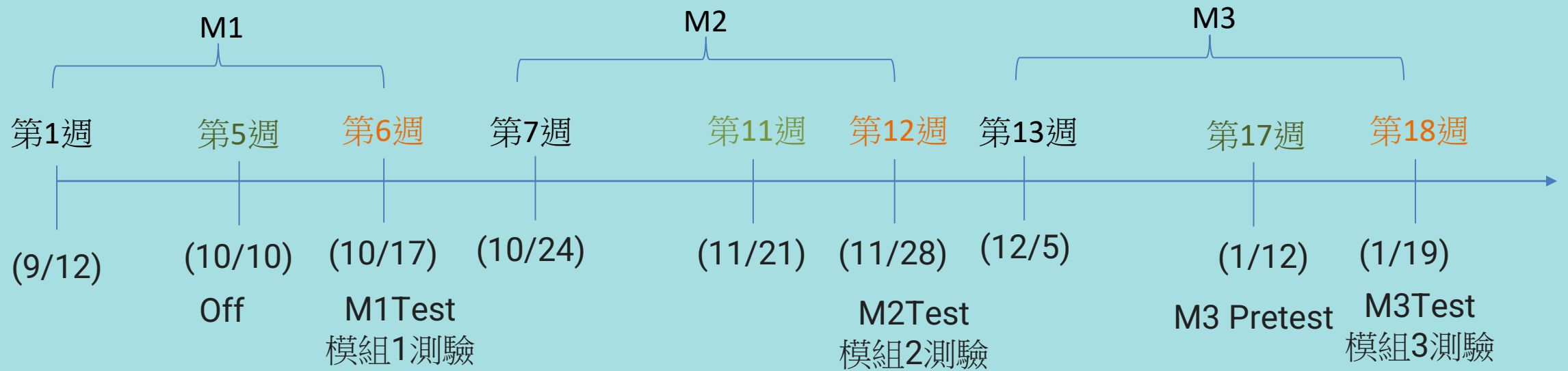




# 112-1基礎程式設計(13)

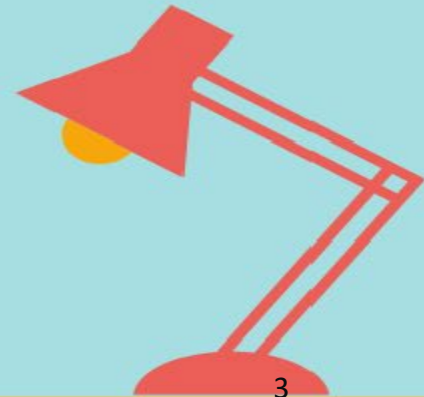
亞大資工系

# 課程進度



# 課程大綱

- W1-Python簡介及程式工具
- W2-變數和運算
- W3-迴圈和格式化輸出
- W4-判斷式和容器
- W5-字串處理和輸出入
- W6-M1測驗
- W07-字典容器
- W08-檔案處理
- W09-函數
- W10-進階流程控制
- W11-進階運算和生成器
- W12-M2測驗
- W13-進階函數
- W14-類別
- W15-進階類別
- W16-模組和套件
- W17-進階設計
- W18-M3測驗



# 本週主題-進階函數

- Week14-進階函數
  - Topic 1(主題1)-函數定義和呼叫的複習
  - Topic 2(主題2)-參數和傳回值的資料型別
  - Topic 3(主題3)-遞迴函數 (Recursion)
  - Topic 4(主題4)-Lambda 函數(Anonymous Function)
  - Topic 5(主題5)-JSON格式處理
  - Topic 6(主題6)-亂數(random)
  - Topic 7(主題7)-用圖表呈現資料



# Topic 1-函數定義和呼叫的複習

- 函數的定義(definition)
- 函數的呼叫(call)
- 可變參數\*參數
- 可變參數\*\*參數



# Topic 2-參數和傳回值的資料型別(3.5 版新加入)

```
def gcd1(x, y):  
    r=x%y  
    while r!=0:  
        x=y;y=r  
        r=x%y  
    return y
```

```
a=240; b=96  
print(f"{a}, {b}, {gcd1(a,b)}")
```

```
def gcd2(x:int, y:int)->int:  
    r=x%y  
    while r!=0:  
        x=y;y=r  
        r=x%y  
    return y
```

```
a=240; b=96  
print(f"{a}, {b}, {gcd2(a,b)}")
```



# Topic 3-遞迴函數 (Recursion)

```
def gcd1(x, y):  
    r=x%y  
    while r!=0:  
        x=y;y=r  
        r=x%y  
    return y
```

```
a=240; b=96  
print(f"{a}, {b}, {gcd1(a,b)}")
```

```
def gcd2(x, y):  
    if y == 0:  
        return x  
    else:  
        return gcd2(y, x%y)
```

```
a=240; b=96  
print(f"{a}, {b}, {gcd2(a,b)}")
```

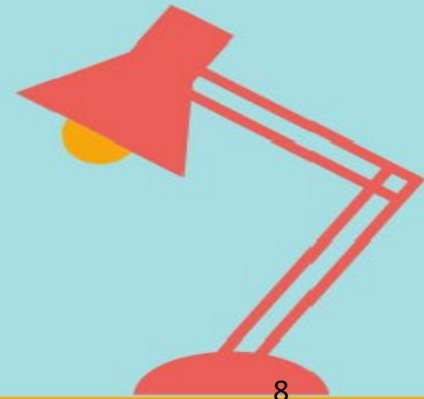


# Topic 4-Lambda 函數

```
def gcd1(x, y):  
    r=x%y  
    while r!=0:  
        x=y;y=r  
        r=x%y  
    return y
```

```
a=240; b=96  
print(f"{a}, {b}, {gcd1(a,b)}")
```

```
gcd = lambda x,y : (gcd(y,x%y)) if x%y else y  
  
a=240; b=96  
print(f"{a}, {b}, {gcd(a,b)}")
```





# 在map()和filter()中使用Lambda函數

```
base=[1, 2, 3, 4]
```

```
square=list(map(lambda x: x**2, base))  
print(square)
```

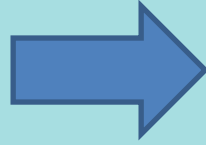
```
data=[0,1,2,3,4,7,8,14,19,31,34]
```

```
odds =list(filter(lambda x: x%2 > 0, data))  
print(odds)  
evens=list(filter(lambda x: x%2 ==0, data))  
print(evens)
```



# Topic 5-JSON

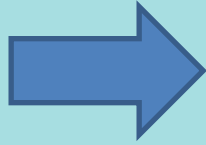
Python Data



JSON Data

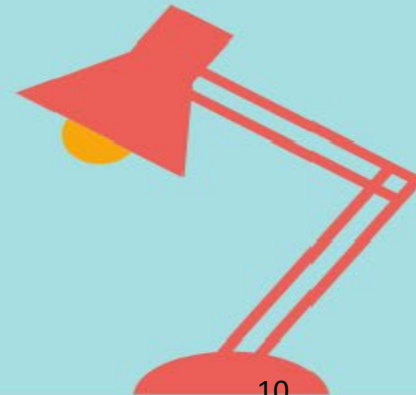
```
import json
data = [ { 'a' : 1, 'b' : 2, 'c' : 3, 'd' : 4, 'e' : 5 } ]
file = open("test.json", "w")
json.dump(data, file)
file.close()
```

Python Data



JSON Data

```
import json
file = open ('test.json')
json_data = json.load(file)
file.close()
```



# Topic 6-亂數(random)

```
rd.seed(12345)
a=rd.random()
b=rd.uniform(2.5, 10.0)
c=rd.randrange(10)
d=rd.choice(['win', 'lose', 'draw'])
print(a,b,c,d)
```

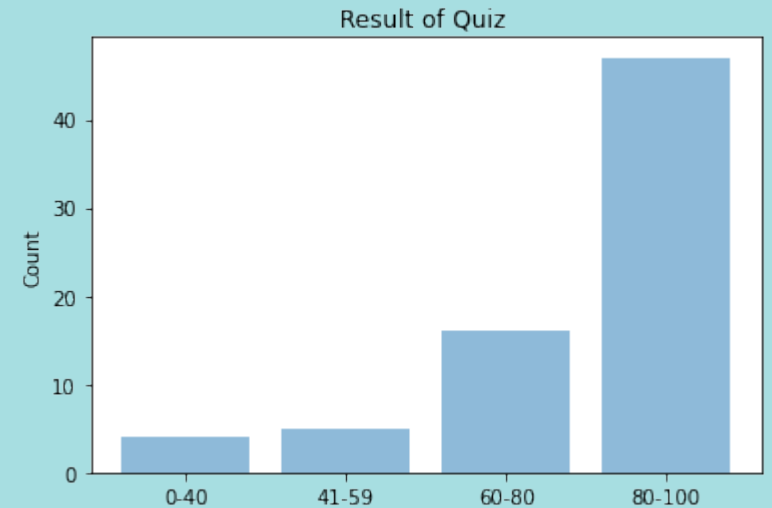
```
# Random float:  0.0 <= x < 1.0
# Random float:  2.5 <= x < 10.0
# Integer from 0 to 9 inclusive
# Single random element from a sequence
```



# Topic 7-用圖表呈現資料-長條圖

#畫出人數分佈的長條圖

```
import matplotlib.pyplot as plt
import numpy as np
stats = [4, 5, 16, 47]
labels = ('0-40', '41-59', '60-80', '80-100')
y_pos = np.arange(len(stats))
plt.bar(y_pos, stats, align='center', alpha=0.5)
plt.xticks(y_pos, labels)
plt.ylabel('Count')
plt.title('Result of Quiz ')
plt.show()
```



# Topic 7-用圖表呈現資料-圓餅圖

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

```
# Pie chart
```

```
stats = [4, 5, 16, 47]
```

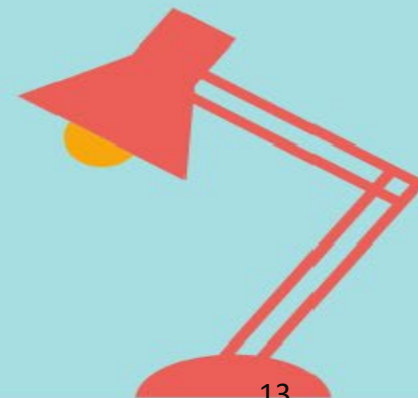
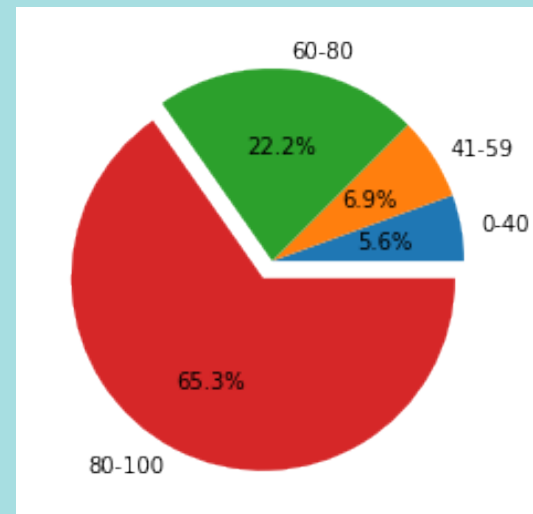
```
labels = ('0-40', '41-59', '60-80', '80-100')
```

```
explode = (0, 0, 0, 0.1) # 切開'80-100'的人數
```

```
fig1, ax1 = plt.subplots()
```

```
ax1.pie(stats, labels=labels, explode=explode, autopct='% .1f%%')
```

```
plt.show()
```





Thanks!

Q&A

