

# Lab146 : SciPy Interpolation

## SciPy插值法

(別怕! 跟著做你就會!)

盧樹台

shuhtai@uch.edu.tw

請至 [www.hcdtech.com.tw](http://www.hcdtech.com.tw) 下載教材



<http://www.hcdtech.com.tw/Python.htm>



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所有的考卷都可以考100分，是我們自己錯過了！

## 學習秘訣=發問+練習

考卷發下去，時間到了收回來，如果沒有考到100分，這很正常。重點來了，不會的可以問，問完了練習，準備好了考卷再發下去。第二次還是沒有考到100分，這也很正常。沒關係，再來一次，不會的可以問，問完了練習，準備好了考卷第三次再發下去，.....，考到第N次如果還是沒有考到100分。沒關係，再來，不會的可以問，問完了練習，N+1次、N+2次、.....，你們都很聰明，知道我在說什麼，到最後考卷一定可以考100分！看懂了妳/你就會知道，原來學習的秘訣就是發問和練習！今天開始不懂就問，問完了練習，明年的妳/你肯定不一樣！



# 學習如何學習！

1

1 2

1 2 3

.....

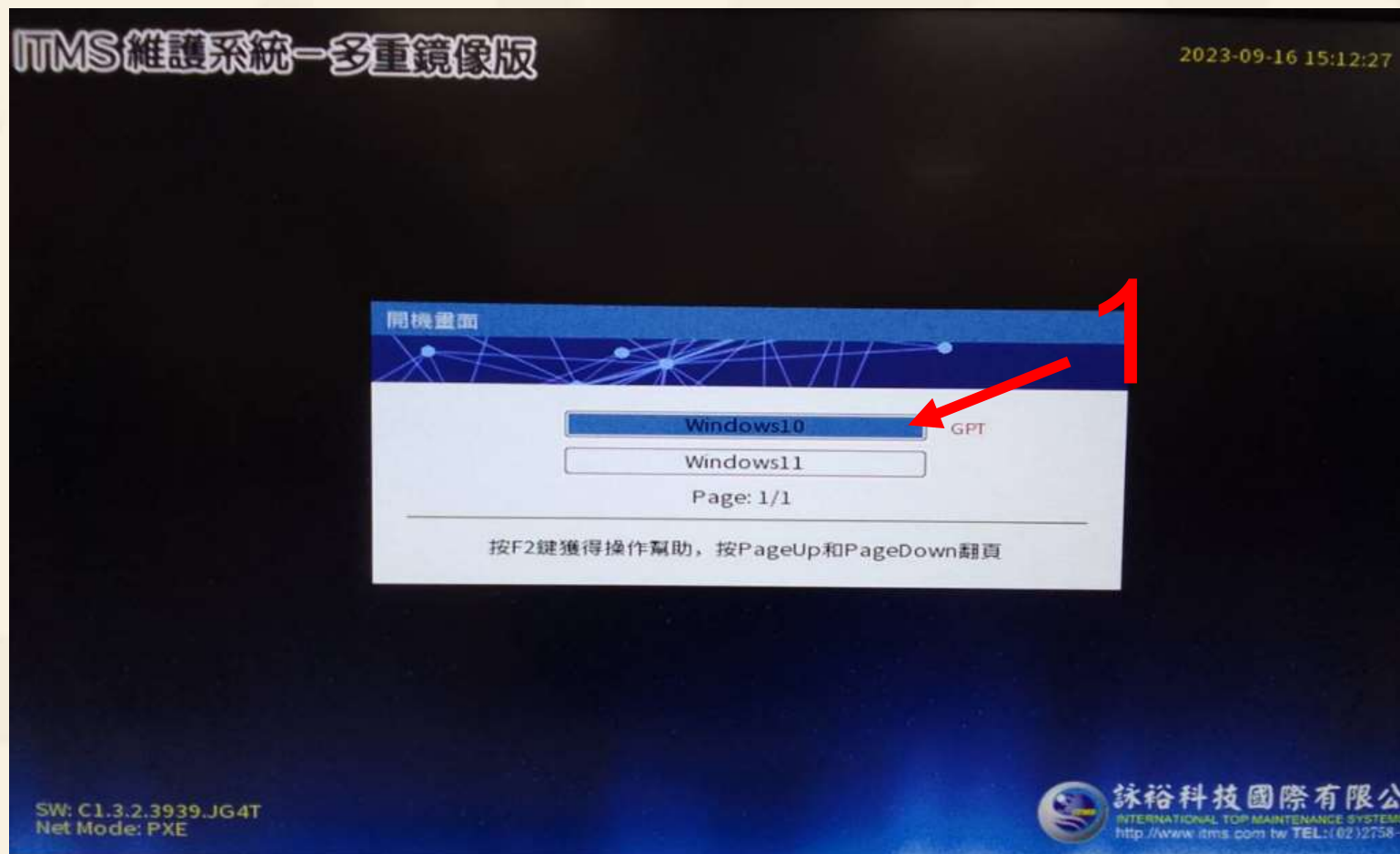
1 2 3 4 5 6 7 8 9 10

## 金字塔念書法



如果一本書有10個章節！先看第1章，在看第2章之前再把第1章看一遍，在看第3章之前再把第1, 2章看一遍，.....，等看到第10章的時候，第1, 2, 3, 4章恐怕已經背起來了！我稱這種念書法為金字塔念書法，今天開始照著做，明年的妳/你肯定不一樣！

# 請使用 Windows 10



## 1. 選用 Windows 10.

# 善用 Google 翻譯





# 請先開啟網頁閱讀

請用善用 Google 翻譯 讀懂 網頁 內容

SciPy Tutorial

- SciPy Home
- SciPy Intro
- SciPy Getting Started
- SciPy Constants
- SciPy Optimizers
- SciPy Sparse Data
- SciPy Graphs
- SciPy Spatial Data
- SciPy Matlab Arrays
- SciPy Interpolation**
- SciPy Significance Tests

Quiz/Exercises

- SciPy Editor
- SciPy Quiz
- SciPy Exercises

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## SciPy Interpolation

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### What is Interpolation?

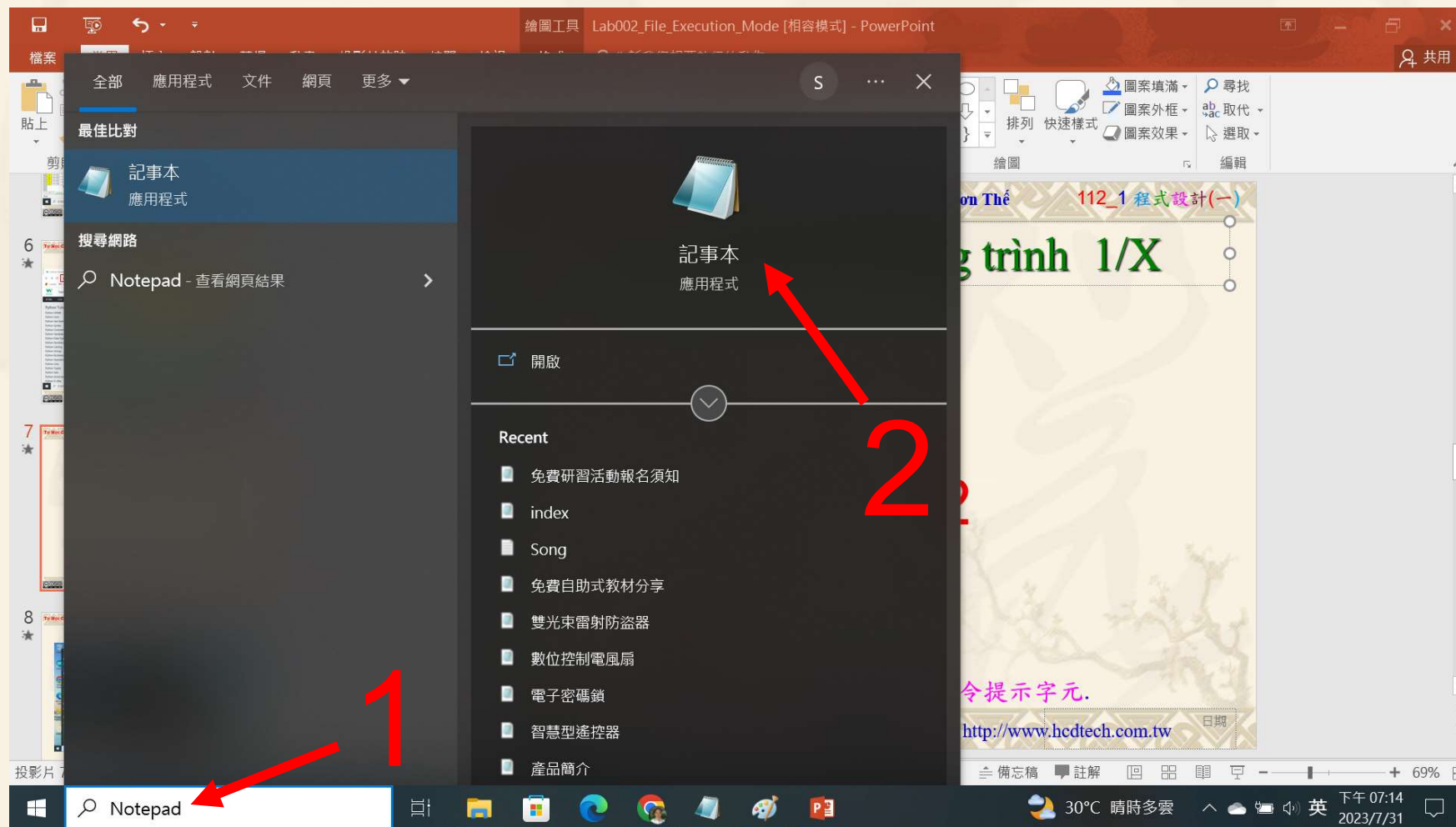
Interpolation is a method for generating points between given points.

For example: for points 1 and 2, we may interpolate and find points 1.33 and 1.66.

Interpolation has many usage, in Machine Learning we often deal with missing data in a dataset, interpolation is often used to substitute those values.

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# 建立程式文件 1/4



1. 鍵盤輸入Notepad. 2. 用滑鼠點選記事本.



# 建立程式文件 2/4

```

*未命名 - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明
print("P11211XXX practices Lab146.")

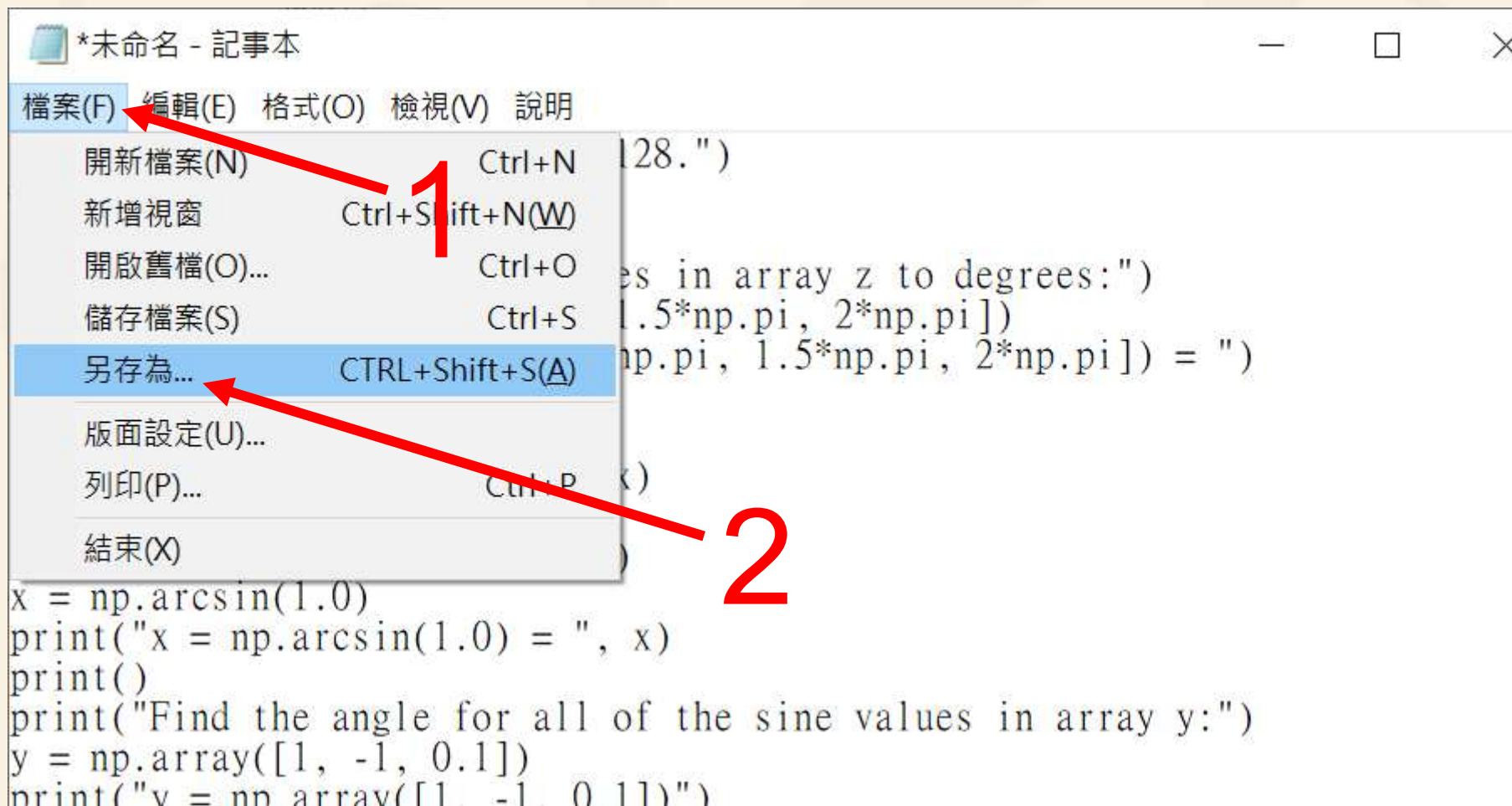
from scipy.interpolate import interp1d
from scipy.interpolate import UnivariateSpline
from scipy.interpolate import Rbf
import numpy as np
print("For given xs and ys interpolate values from 2.1, 2.2... to 2.9:")
xs = np.arange(10)
ys = 2*xs + 1
interp_func = interp1d(xs, ys)
newarr = interp_func(np.arange(2.1, 3, 0.1))
print(newarr)
print()
print("Find univariate spline interpolation for 2.1, 2.2... 2.9 for the following non linear points:")
xs = np.arange(10)
ys = xs**2 + np.sin(xs) + 1
interp_func = UnivariateSpline(xs, ys)
newarr = interp_func(np.arange(2.1, 3, 0.1))
print(newarr)
print()
print("Interpolate following xs and ys using rbf and find values for 2.1, 2.2 ... 2.9:")
xs = np.arange(10)
ys = xs**2 + np.sin(xs) + 1
interp_func = Rbf(xs, ys)
newarr = interp_func(np.arange(2.1, 3, 0.1))
print(newarr)
    
```

將P11211XXX修改為您的學號



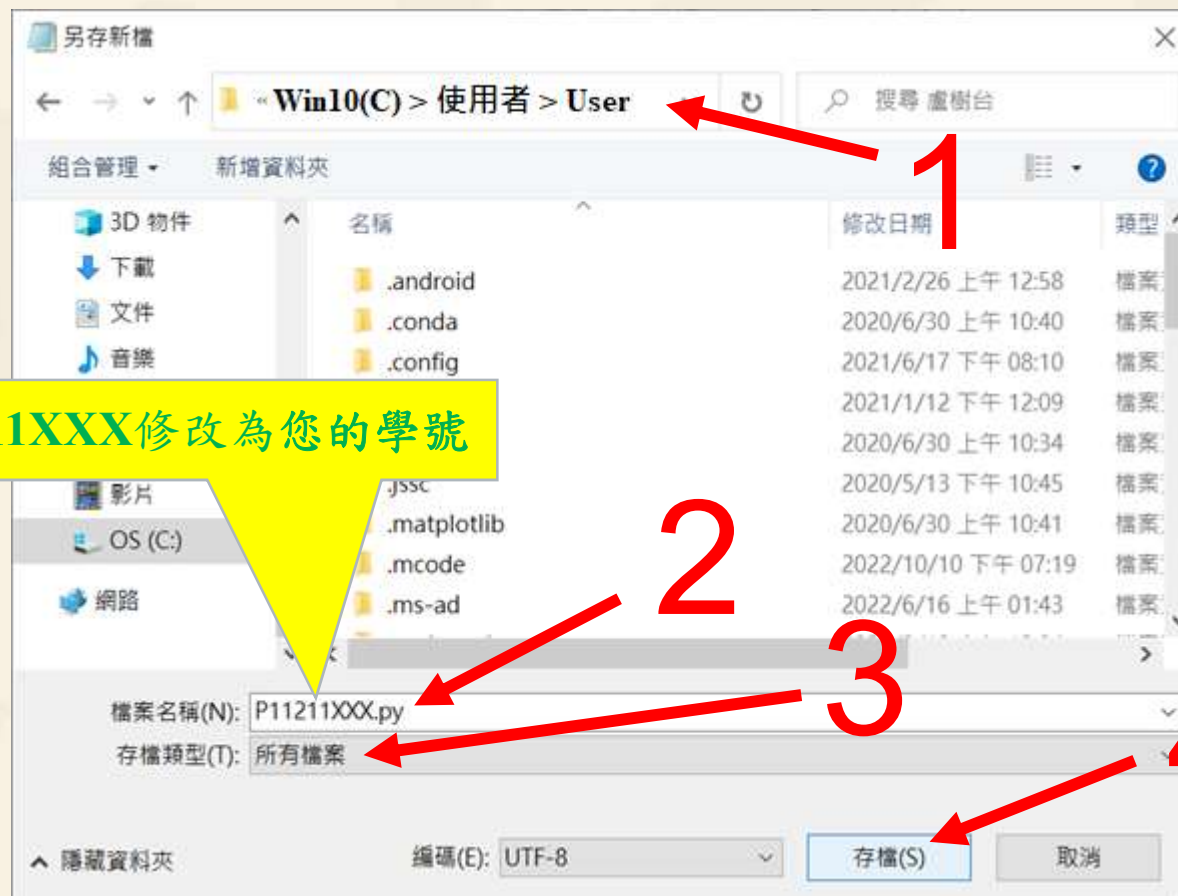
## 1. 用鍵盤輸入程式代碼.

# 建立程式文件 3/4



1. 用滑鼠點選檔案. 2. 用滑鼠點選另存為....

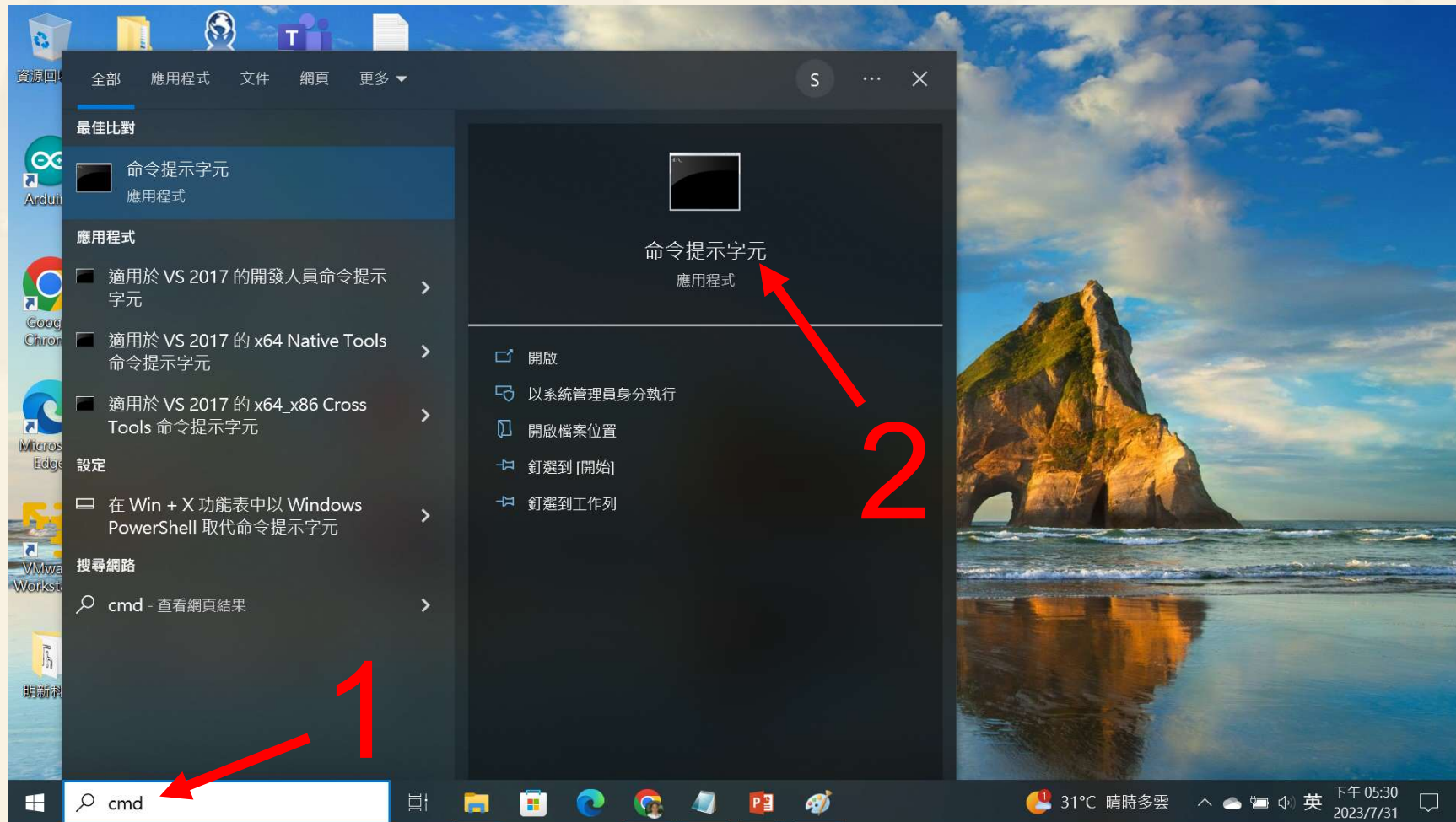
# 建立程式文件 4/4



1. 資料夾 = C:\使用者>User>.
2. 檔案名稱 = P11211XXX.py .
3. 存檔類型(T) = 所有檔案.
4. 用滑鼠點選存檔.

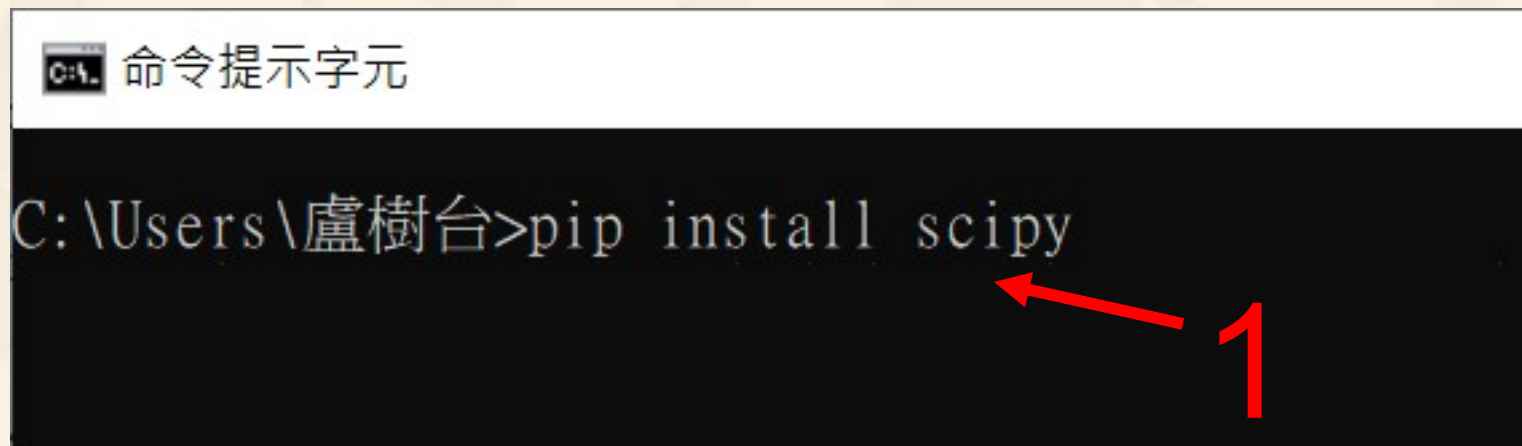


# 檔案執行模式 1/3



1. 鍵盤輸入cmd.
2. 用滑鼠點選命令提示字元.

# 檔案執行模式 2/3



```
C:\Users\盧樹台>pip install scipy
```



1. 用鍵盤輸入pip install scipy.
2. 按一下Enter.



# 檔案執行模式 3/3

```
C:\Users\盧樹台>pip install scipy
WARNING: Ignoring invalid distribution -ip (c:\python39\lib\site-packages)
WARNING: Ignoring invalid distribution - (c:\python39\lib\site-packages)
WARNING: Ignoring invalid distribution -ip (c:\python39\lib\site-packages)
WARNING: Ignoring invalid distribution - (c:\python39\lib\site-packages)
Collecting scipy
  Downloading scipy-1.11.4-cp39-cp39-win_amd64.whl (44.3 MB)
    |-----| 44.3 MB 131 kB/s
Requirement already satisfied: numpy<1.28.0,>=1.21.6 in c:\python39\lib\site-packages (from scipy) (1.26.1)
WARNING: Ignoring invalid distribution -ip (c:\python39\lib\site-packages)
WARNING: Ignoring invalid distribution - (c:\python39\lib\site-packages)
Installing collected packages: scipy
WARNING: Ignoring invalid distribution -ip (c:\python39\lib\site-packages)
WARNING: Ignoring invalid distribution - (c:\python39\lib\site-packages)
Successfully installed scipy-1.11.4
WARNING: Ignoring invalid distribution -ip (c:\python39\lib\site-p
WARNING
WARNING
WARNING
WARNING: Ignoring invalid distribution -ip (c:\python39\lib\site-p
WARNING: Ignoring invalid distribution - (c:\python39\lib\site-pac
WARNING: You are using pip version 21.1.1; however, version 23.3.2
You should consider upgrading via the 'c:\python39\python.exe -m p

C:\Users\盧樹台>Python P11211XXX.py
```

將P11211XXX修改為您的學號

1. 用鍵盤輸入Python P11211XXX.py .
2. 按一下Enter.



# Verification Criteria of Lab146

## (Lab146的驗收規範) SciPy插值法

**P11211XXX 必需  
更換為您的學號**

Ask the teacher to give you points after completing the illustrated results.

(完成右圖指定成果後請教師在您的座位驗收並讓您簽名加分)

```
C:\Users\盧樹台>Python P11211XXX.py
P11211XXX practices Lab146.
For given xs and ys interpolate values from 2.1, 2.2... to 2.9:
[5.2 5.4 5.6 5.8 6. 6.2 6.4 6.6 6.8]

Find univariate spline interpolation for 2.1, 2.2... 2.9 for the following non linear points:
[5.62826474 6.03987348 6.47131994 6.92265019 7.3939103 7.88514634
8.39640439 8.92773053 9.47917082]

Interpolate following xs and ys using rbf and find values for 2.1, 2.2 ... 2.9:
[6.25748981 6.62190817 7.00310702 7.40121814 7.8161443 8.24773402
8.69590519 9.16070828 9.64233874]
```

```
P11211XXX - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明
print("P11211XXX practices Lab146.")

from scipy.interpolate import interp1d
from scipy.interpolate import UnivariateSpline
from scipy.interpolate import Rbf
import numpy as np
print("For given xs and ys interpolate values from 2.1, 2.2... to 2.9:")
xs = np.arange(10)
ys = 2*xs + 1
interp_func = interp1d(xs, ys)
newarr = interp_func(np.arange(2.1, 3, 0.1))
print(newarr)
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print("Find univariate spline interpolation for 2.1, 2.2... 2.9 for the following non linear points:")
xs = np.arange(10)
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xs = np.arange(10)
ys = xs**2 + np.sin(xs) + 1
interp_func = Rbf(xs, ys)
newarr = interp_func(np.arange(2.1, 3, 0.1))
print(newarr)
```

**每一個學生都要做Lab146至少一次!**

# 養成良好的工作態度

- 離開實驗室時請整理自己的工作座位，為自己的工作態度加分：
  - (1)滑鼠鍵盤歸位 (2)電腦關機 (3)螢幕關閉電源 (4)椅背靠妥 (5)個人責任區(工作座位及週邊範圍)應整潔，不遺留垃圾紙屑等。

