

Lab145 : Spatial Data

空間數據

(別怕! 跟著做你就會!)

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請至 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

.....

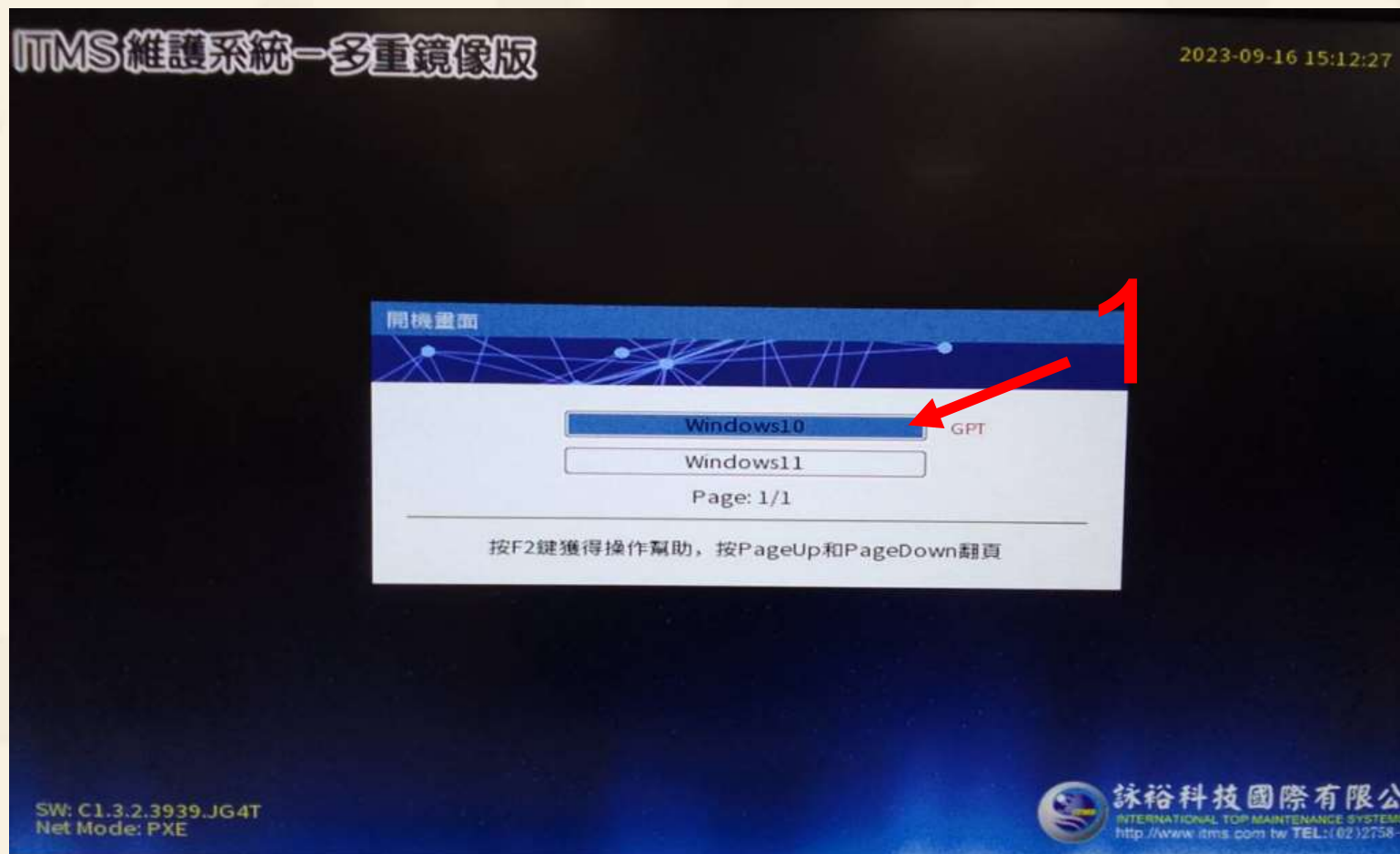
1 2 3 4 5 6 7 8 9 10

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.

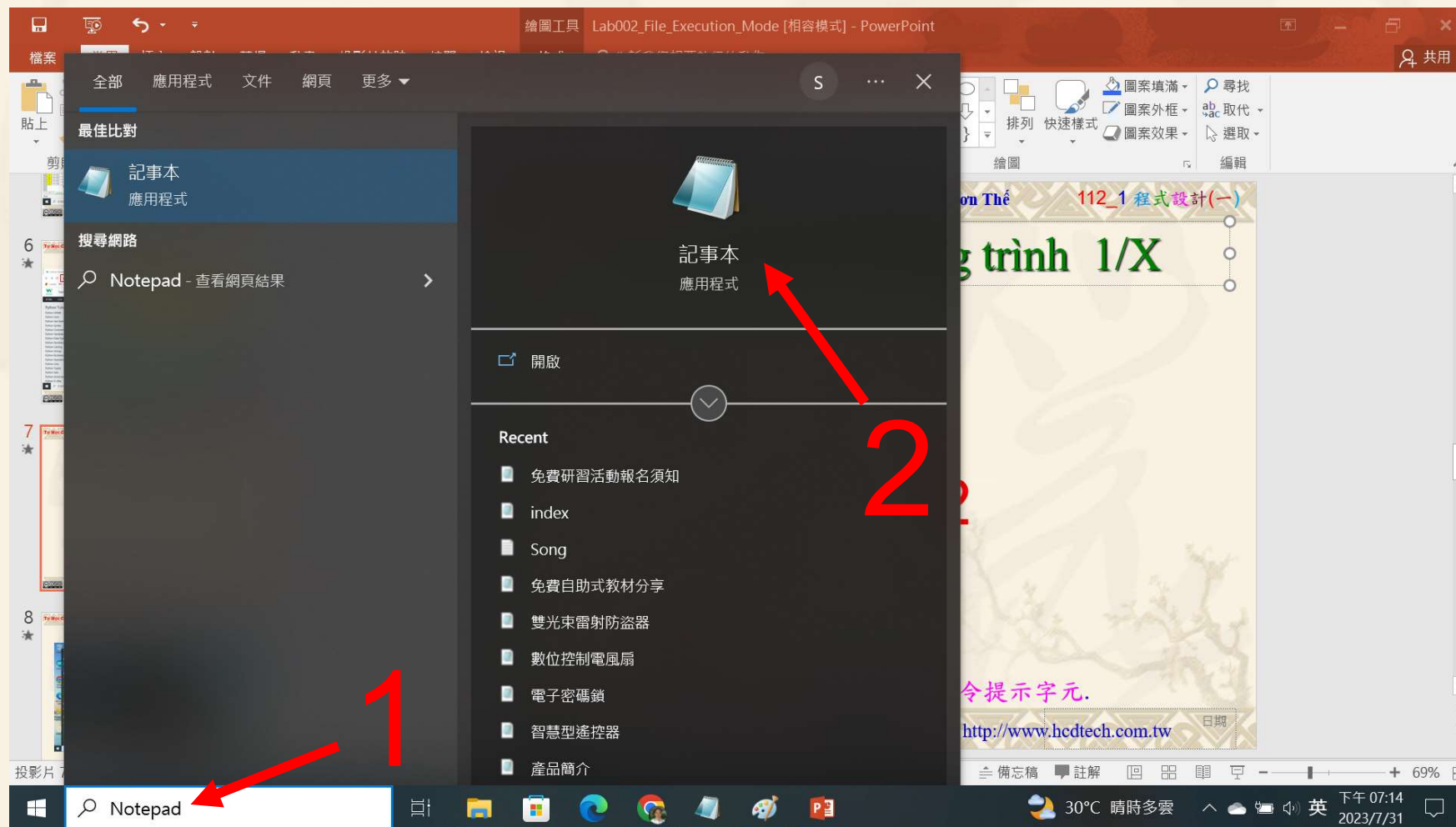
善用 Google 翻譯



請先開啟網頁閱讀

The screenshot shows a web browser window with the address bar containing `w3schools.com/python/scipy/scipy_spatial_data.php`. A yellow callout box with a red border points to the address bar and contains the text: **請用善用 Google 翻譯 讀懂 網頁 內容**. The page content includes a navigation menu on the left, a main heading "SciPy Spatial Data", and a sub-heading "Working with Spatial Data". The text below the sub-heading reads: "Spatial data refers to data that is represented in a geometric space. E.g. points on a coordinate system. We deal with spatial data problems on many tasks." The browser's taskbar at the bottom shows the date and time as 2023/12/22, 下午 07:22.

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 Lab145.")

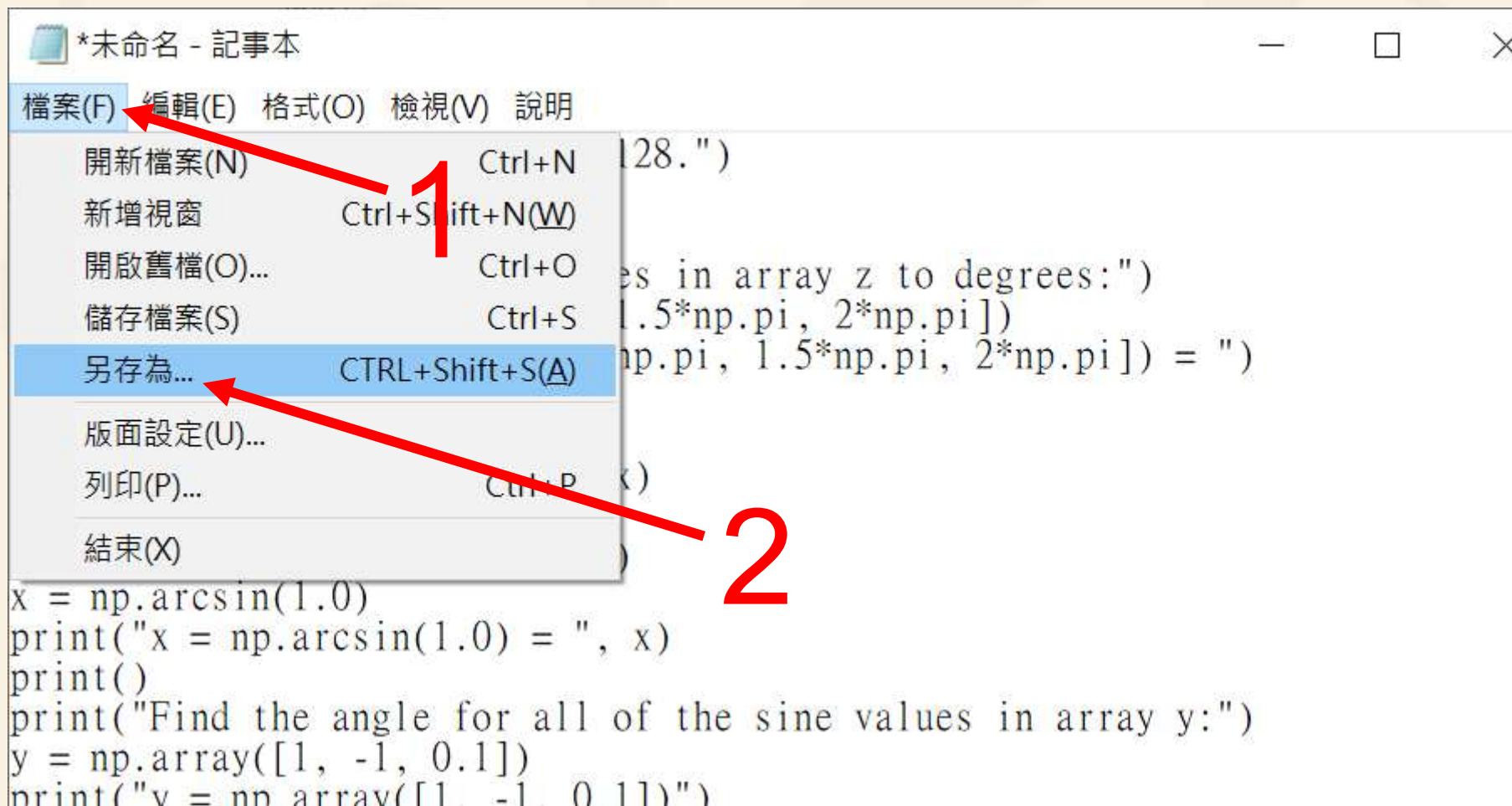
import numpy as np
from scipy.spatial import Delaunay
from scipy.spatial import ConvexHull
from scipy.spatial import KDTree
import matplotlib.pyplot as plt
print("Create a triangulation from following points:")
points = np.array([[2, 4], [3, 4], [3, 0], [2, 2], [4, 1]])
simplices = Delaunay(points).simplices
plt.triplot(points[:, 0], points[:, 1], simplices)
plt.scatter(points[:, 0], points[:, 1], color='r')
plt.show()
print()
print("Create a convex hull for following points:")
points = np.array([[2, 4], [3, 4], [3, 0], [2, 2], [4, 1],
                  [4, 1], [1, 2], [5, 0], [3, 1], [1, 2], [0, 2]])
hull = ConvexHull(points)
hull_points = hull.simplices
plt.scatter(points[:,0], points[:,1])
for simplex in hull_points:
    plt.plot(points[simplex,0], points[simplex,1], 'k-')
plt.show()
print()
print("Find the nearest neighbor to point (1,1):")
points = [(1, -1), (2, 3), (-2, 3), (2, -3)]
kdtree = KDTree(points)
res = kdtree.query((1, 1))
print(res)
    
```

將P11211XXX修改為您的學號



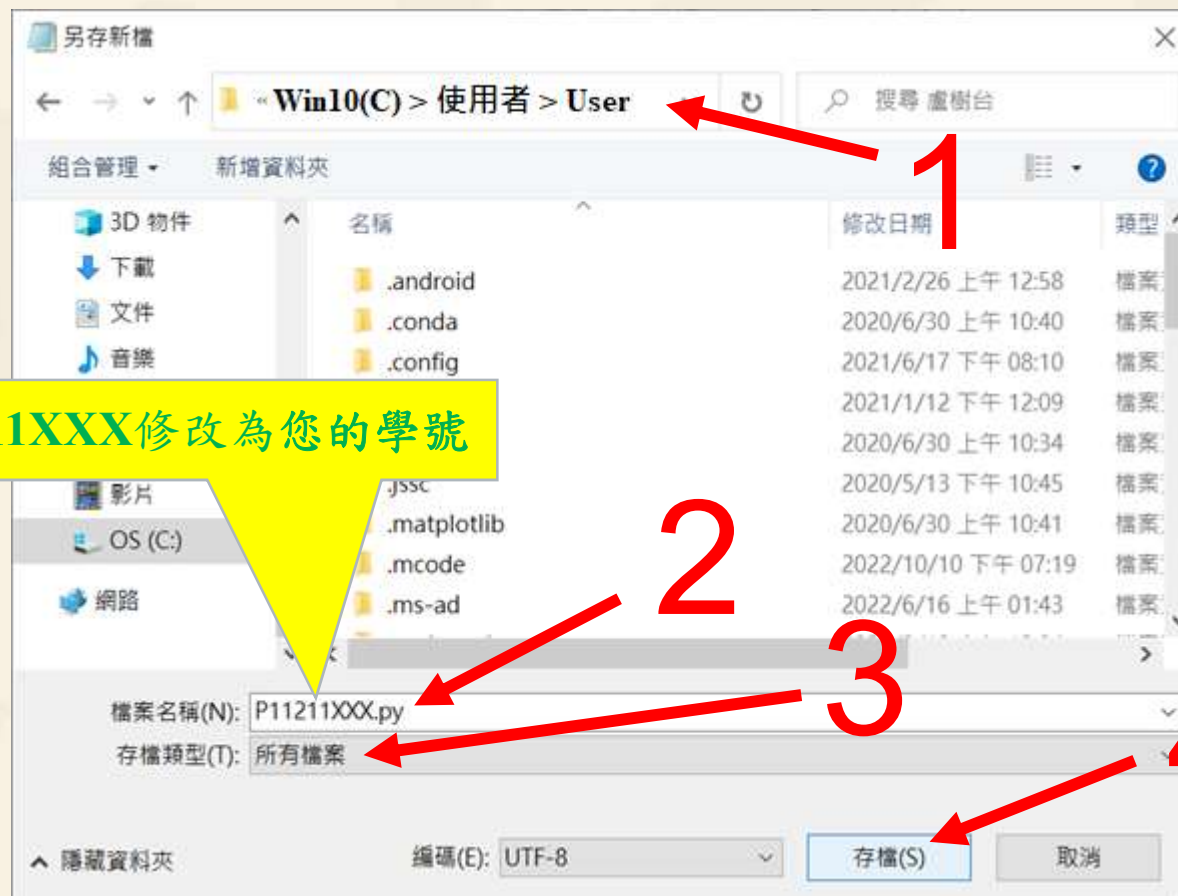
1. 用鍵盤輸入程式代碼.

建立程式文件 3/4



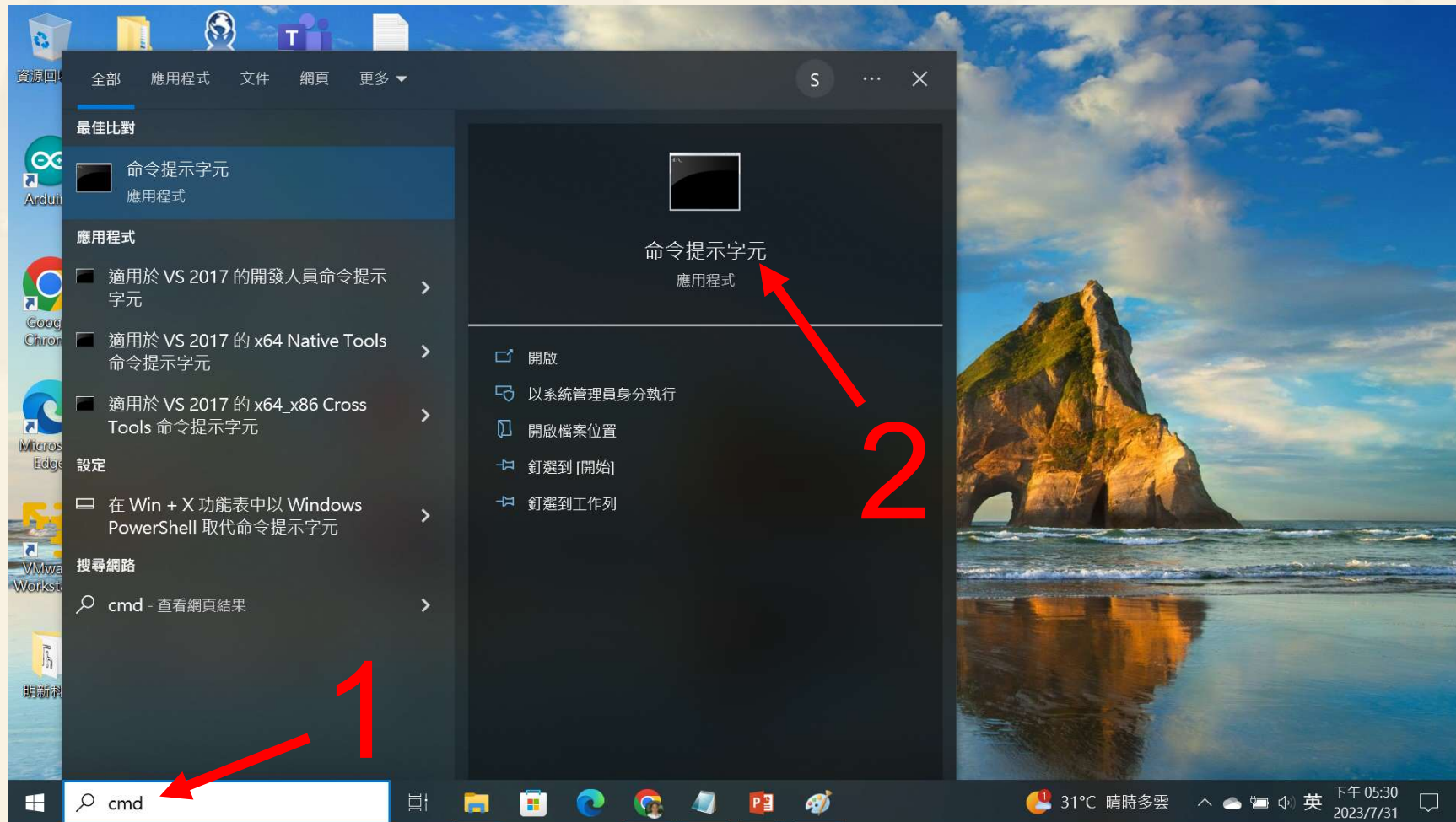
1. 用滑鼠點選檔案. 2. 用滑鼠點選另存為....

建立程式文件 4/4



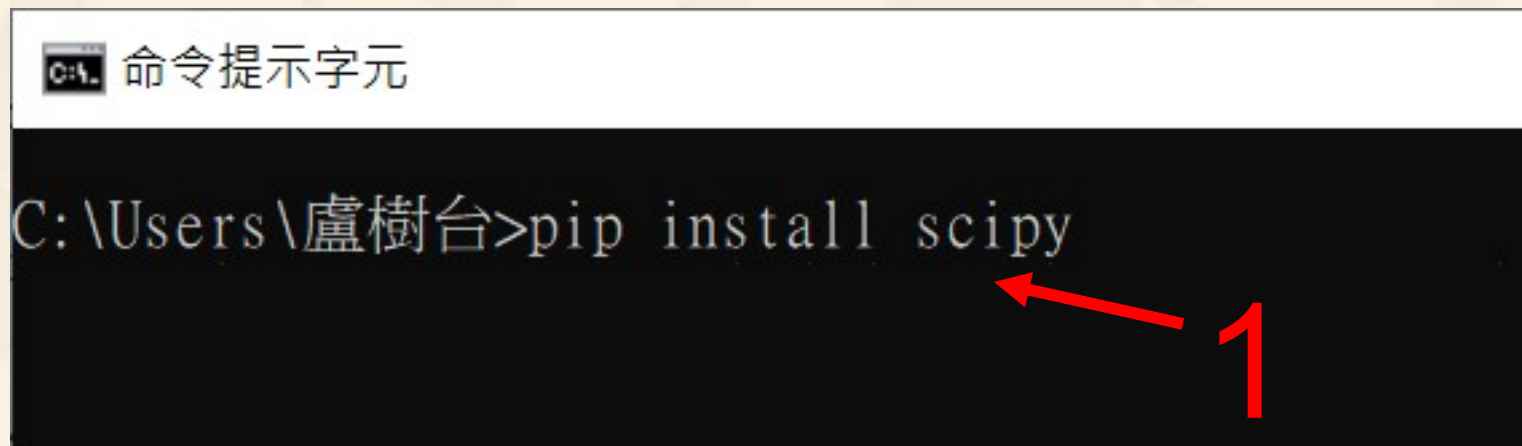
1. 資料夾 = C:\使用者>User>.
2. 檔案名稱 = P11211XXX.py .
3. 存檔類型(T) = 所有檔案.
4. 用滑鼠點選存檔.

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: 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.

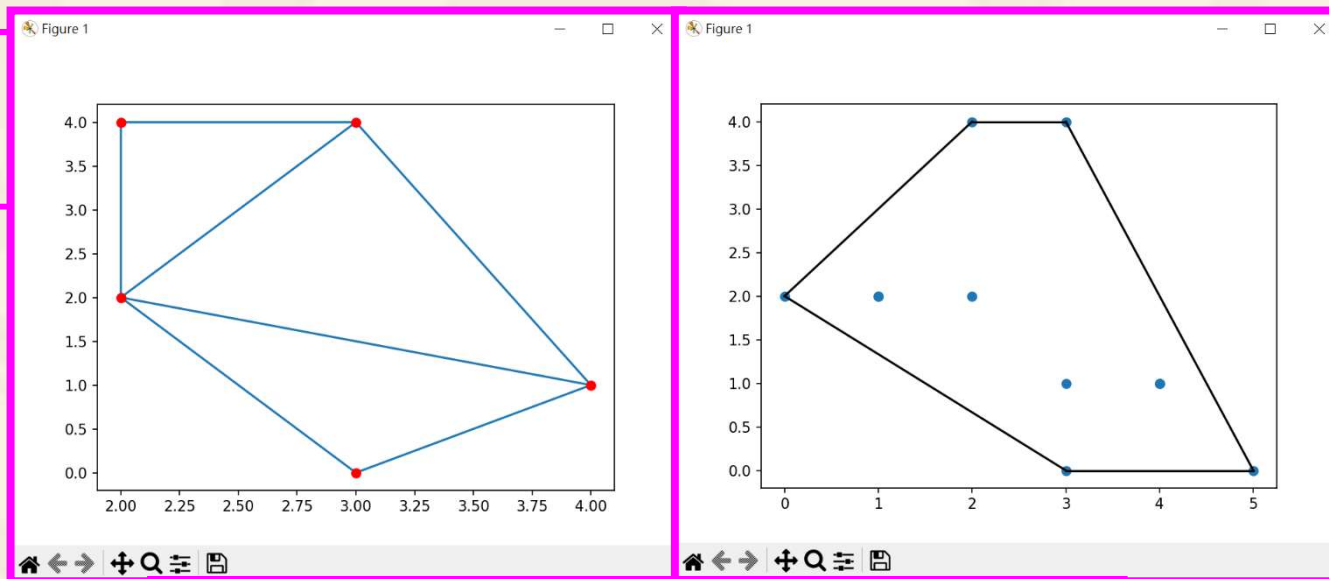
Verification Criteria of Lab145

(Lab145的驗收規範)空間數據

**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 Lab145.
Create a triangulation from following points:
Create a convex hull for following points:
Find the nearest neighbor to point (1,1):
(2.0, 0)
C:\Users\盧樹台>
```

每一個學生都要做Lab145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。

