

# Lab113 : Poisson Distribution

## Poisson分佈

(別怕! 跟著做你就會!)

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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

.....

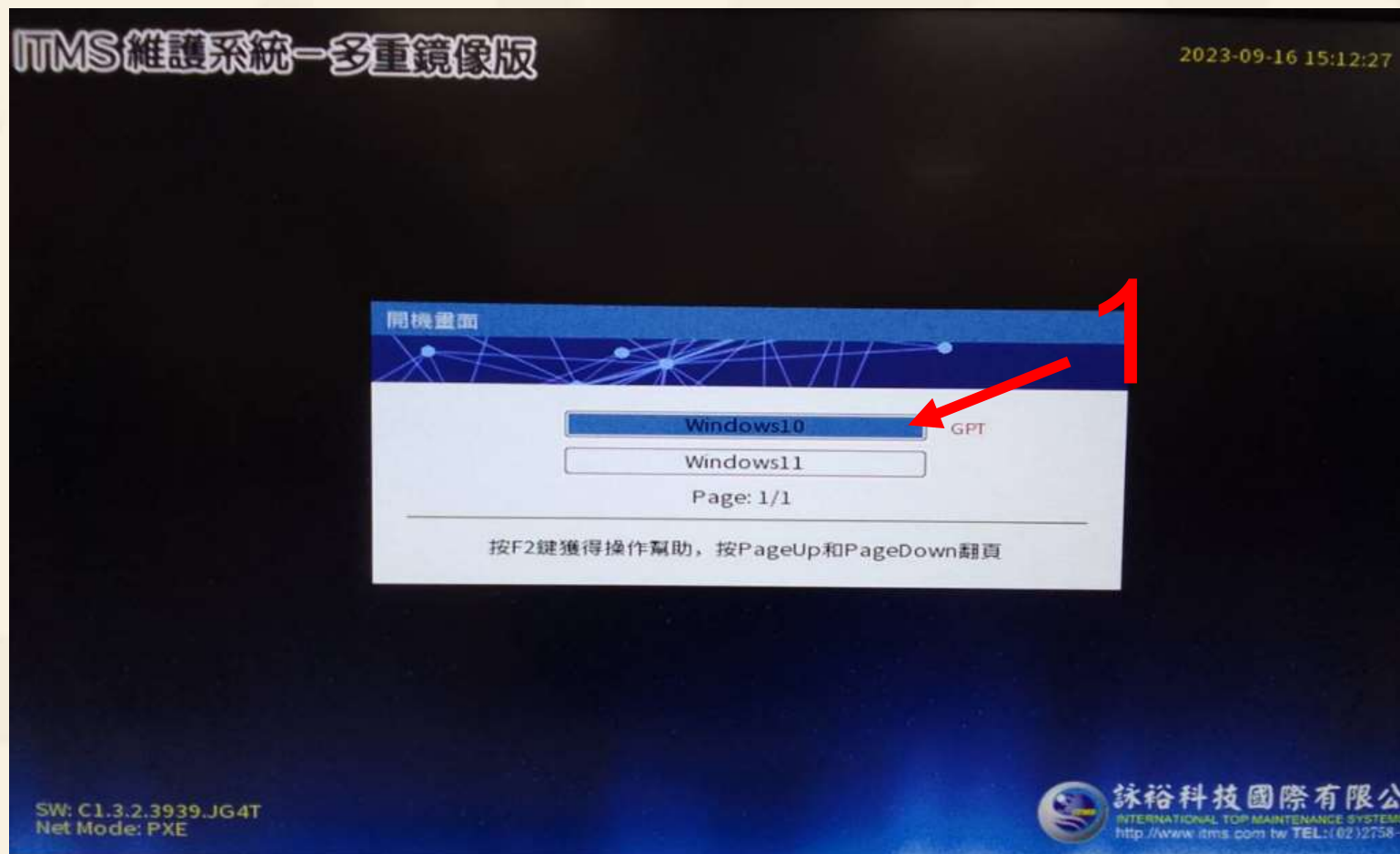
1 2 3 4 5 6 7 8 9 10

## 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

Poisson Distribution

translate - Google 搜尋

w3schools.com/python/numpy/numpy\_random\_poisson.asp

請用善用Google翻譯讀懂網頁內容

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Poisson Distribution

Poisson Distribution is a *Discrete Distribution*.

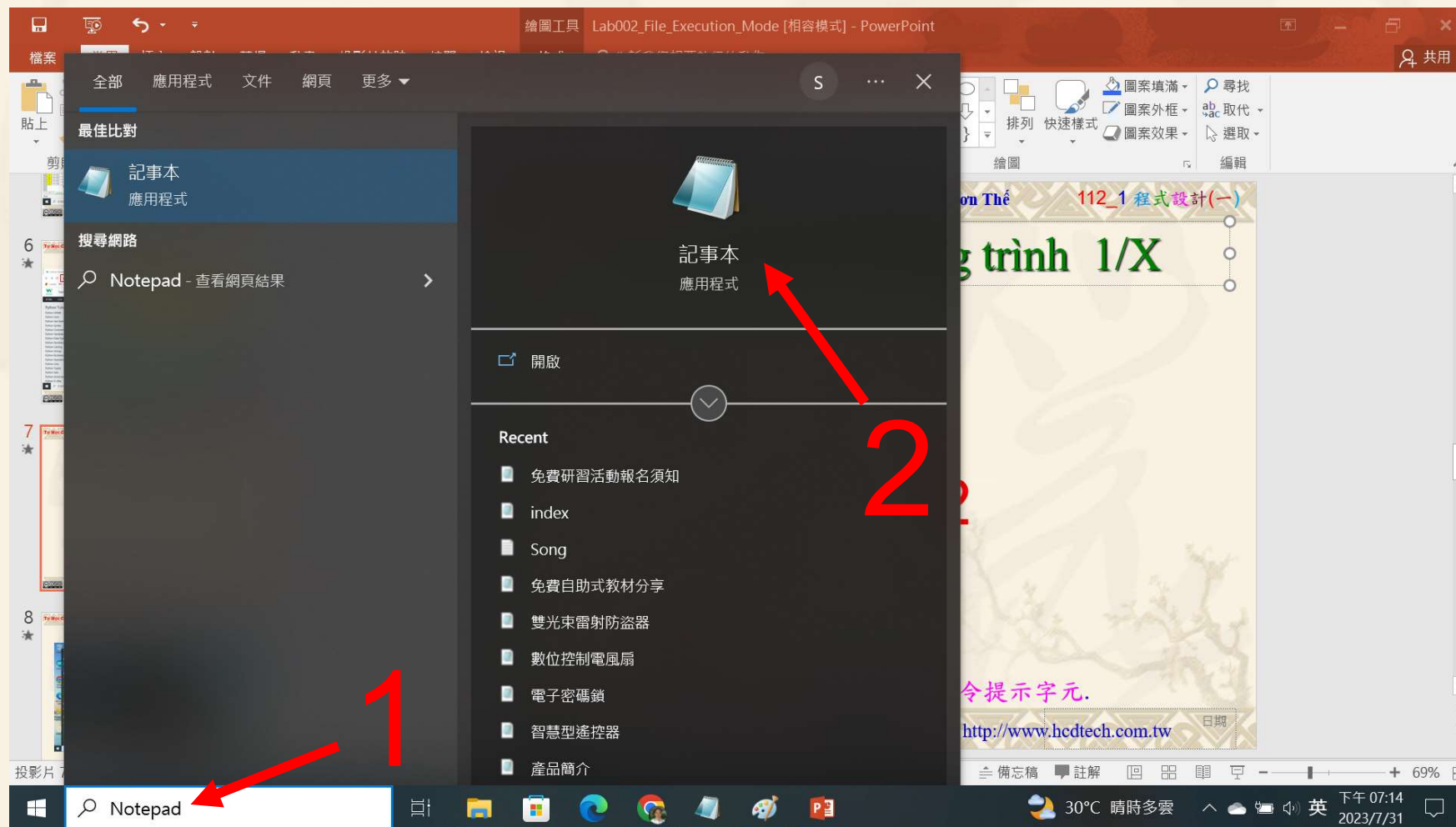
It estimates how many times an event can happen in a specified time. e.g. If someone eats twice a day what is the probability he will eat thrice?

It has two parameters:

`lam` - rate or known number of occurrences e.g. 2 for above problem.

`size` - The shape of the returned array.

# 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

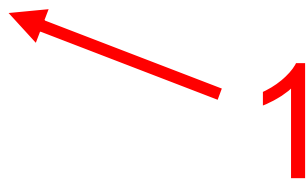
\*未命名 - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明

```
print("P11211XXX practices Lab113.")

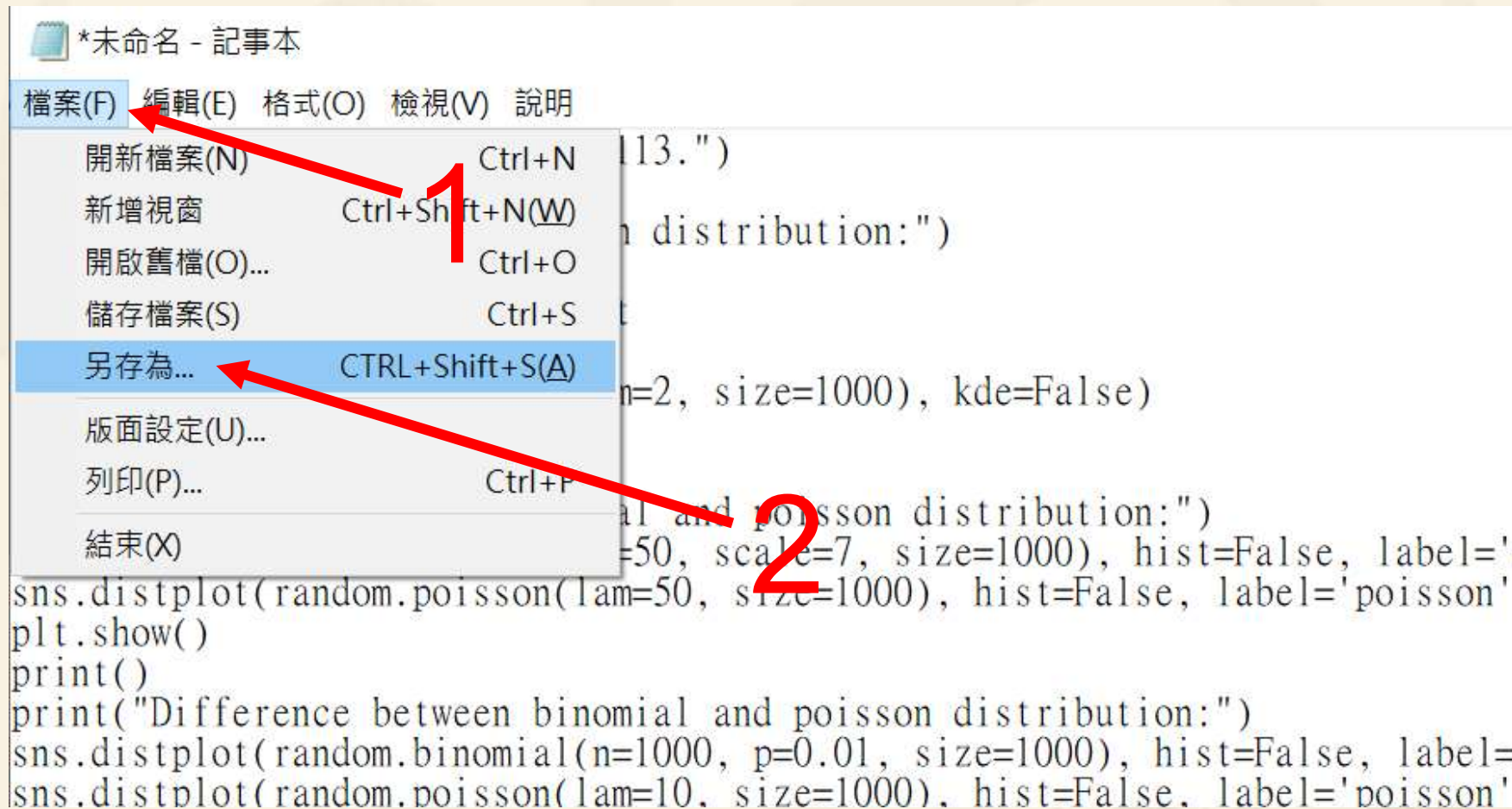
print("Visualization of poisson distribution:")
from numpy import random
import matplotlib.pyplot as plt
import seaborn as sns
sns.distplot(random.poisson(lam=2, size=1000), kde=False)
plt.show()
print()
print("Difference between normal and poisson distribution:")
sns.distplot(random.normal(loc=50, scale=7, size=1000), hist=False, label='normal')
sns.distplot(random.poisson(lam=50, size=1000), hist=False, label='poisson')
plt.show()
print()
print("Difference between binomial and poisson distribution:")
sns.distplot(random.binomial(n=1000, p=0.01, size=1000), hist=False, label='binomial')
sns.distplot(random.poisson(lam=10, size=1000), hist=False, label='poisson')
plt.show()
print()
print("Generate a random 1x10 distribution for occurrence 2:")
x = random.poisson(lam=2, size=10)
print(x)
```

Replace P11211XXX with your student ID



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....

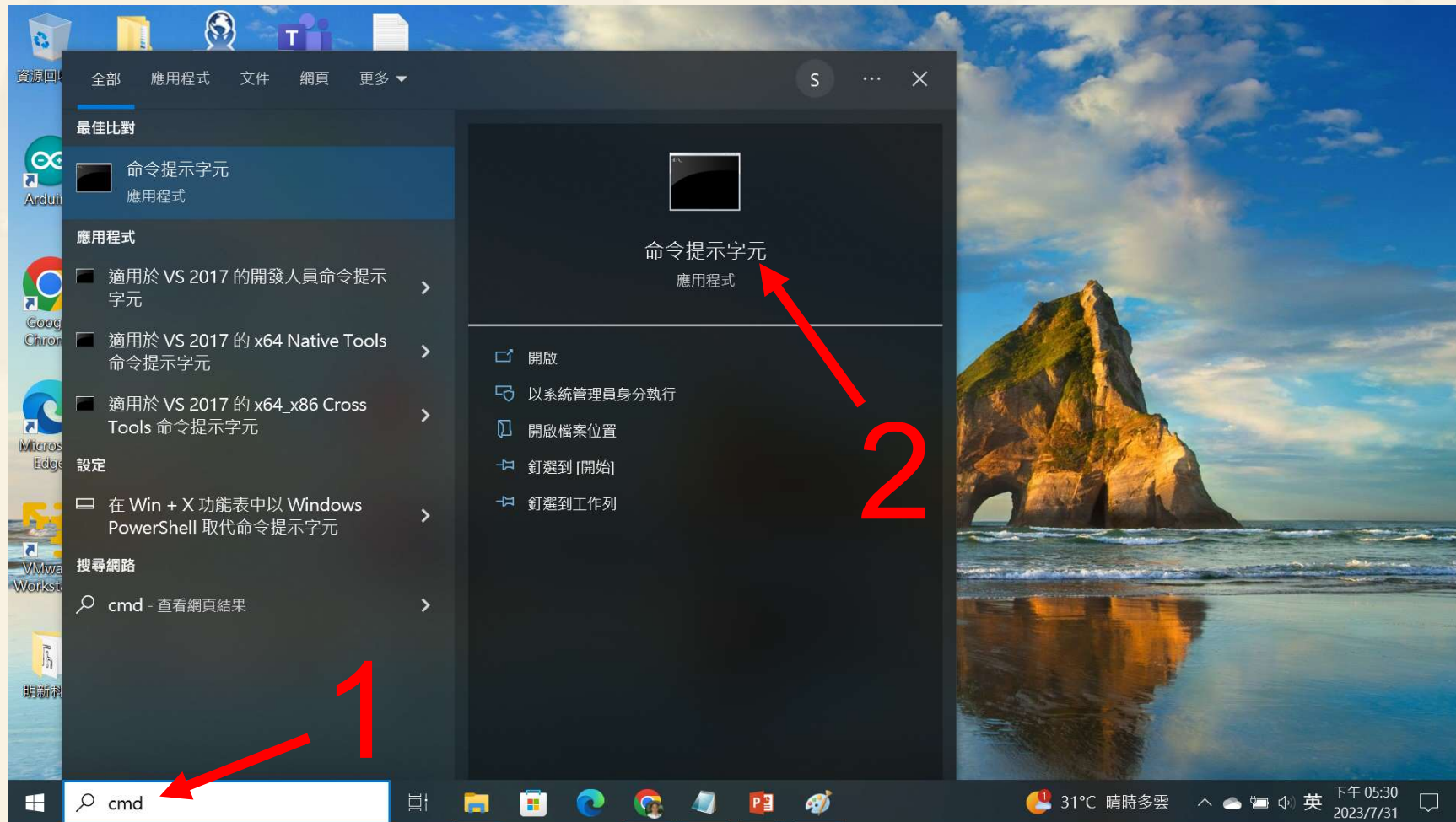
# 建立程式文件 4/4



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 1/7



1. 鍵盤輸入cmd.
2. 用滑鼠點選命令提示字元.

# 檔案執行模式 2/7

```
命令提示字元  
Microsoft Windows [版本 10.0.19045.3693]  
(c) Microsoft Corporation. 著作權所有，並保留一切權利。  
C:\Users\盧樹台>pip install numpy
```

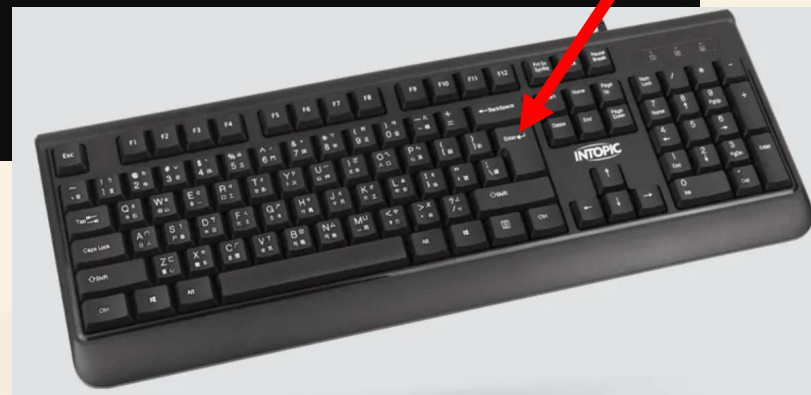


1. 用鍵盤輸入pip install numpy.
2. 按一下Enter.



# 檔案執行模式 3/7

```
C:\> 命令提示字元  
Microsoft Windows [版本 10.0.19045.3693]  
(c) Microsoft Corporation. 著作權所有，並保留一切權利。  
C:\Users\盧樹台>pip install numpy  
WARNING: Ignoring invalid distribution -ip (c:\python39\lib\site-packag  
WARNING: Ignoring invalid distribution - (c:\python39\lib\site-packag  
Requirement already satisfied: numpy in c:\python39\lib\site-packages  
You should consider upgrading via the 'c:\python39\python.exe -m pip  
C:\Users\盧樹台>pip install seaborn
```



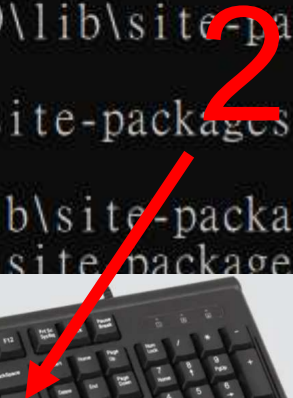
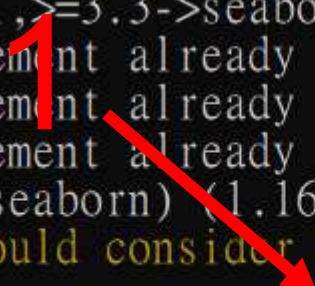
1. 用鍵盤輸入pip install seaborn.
2. 按一下Enter.



# 檔案執行模式 4/7

```
C:\> 命令提示字元
Requirement already satisfied: pyparsing>=2.3.1 in c:\python39\lib\site-package
(3.1.1)
Requirement already satisfied: cyclor>=0.10 in c:\python39\lib\site-packages (f
10.1)
Requirement already satisfied: ... 1.3.1 in c:\python39\lib\site-packag
) (1.4.5)
Requirement already satisf...>=3.1.0 in c:\python39\lib\site-packages (fr
!=3.6.1,>=3.3->seaborn) (3
Requirement already satisf...data>=2022.1 in c:\python39\lib\site-packages
Requirement already satisf...pytz>=2020.1 in c:\python39\lib\site-packages (f
Requirement already satisf...six>=1.5 in
=3.3->seaborn) (1.16.0)
You should consider upgrading via the 'c:\p
C:\Users\盧樹台>Python P11211XXX.py
```

Replace P11211XXX with your student ID

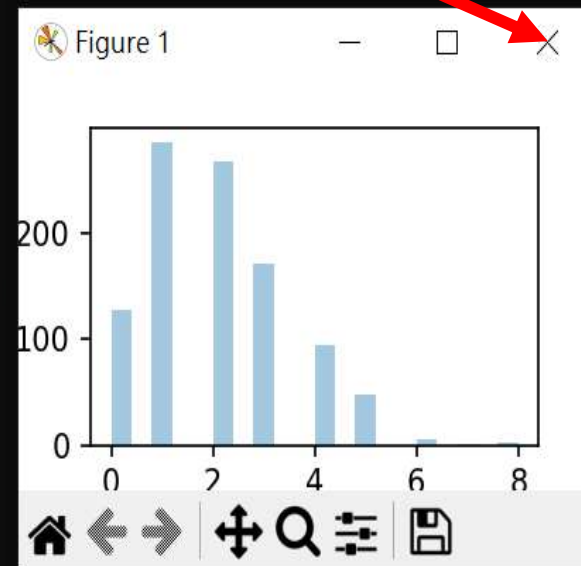


- 1. 用鍵盤輸入Python P11211XXX.py .
- 2. 按一下Enter.

# 檔案執行模式 5/7

1

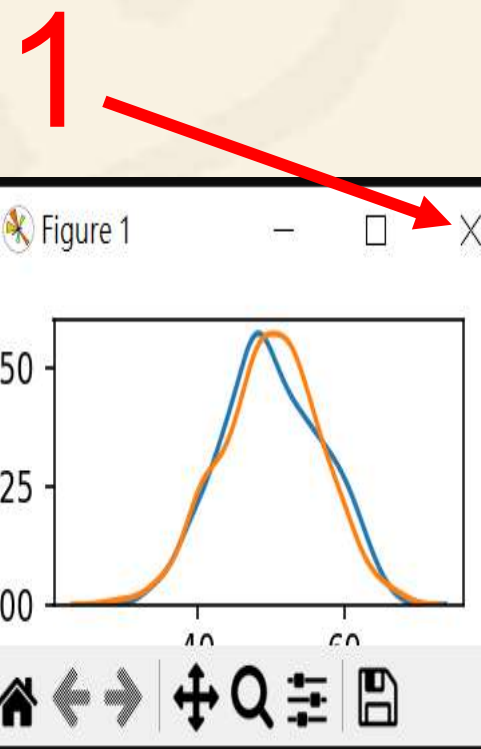
```
C:\Users\盧樹台>Python P11211XXX.py
P11211XXX practices Lab113.
Visualization of poisson distribution:
C:\Users\盧樹台\P11211XXX.py:7: UserWarning:
`distplot` is a deprecated function and will be removed in seaborn v0.14.0.
Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).
For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751
sns.distplot(random.poisson(lam=2, size=1000), kde=False)
```



1. 用滑鼠點選 X.



# 檔案執行模式 6/7

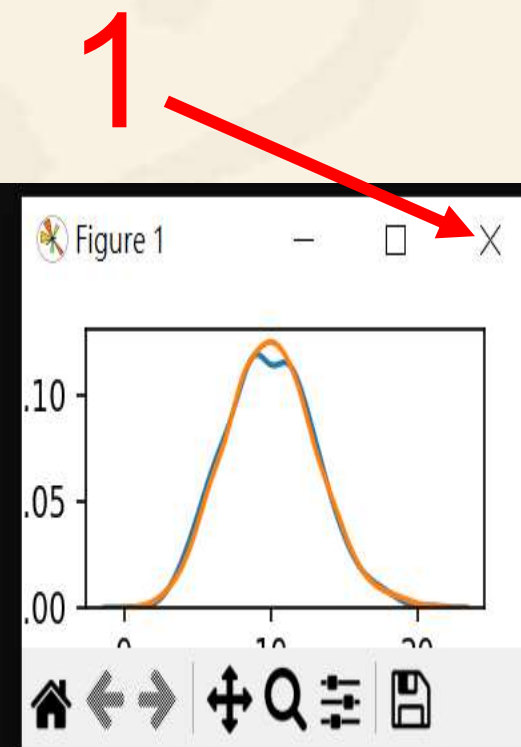


1. 用滑鼠點選 X.



# 檔案執行模式 7/7

```
C:\Users\盧樹台\P11211XXX.py:17: UserWarning:  
`distplot` is a deprecated function and will be removed in seaborn v0.14.0.  
Please adapt your code to use either `displot` (a figure-level function with  
similar flexibility) or `kdeplot` (an axes-level function for kernel density plots).  
For a guide to updating your code to use the new functions, please see  
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751  
sns.distplot(random.poisson(lam=10, size=1000), hist=False, label='poisson')
```



1. 用滑鼠點選 X.

# Verification Criteria of Lab113 (Lab113的驗收規範) Poisson分佈

**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)

The collage contains the following elements:

- Code Snippets:**

```

sns.distplot(random.binomial(n=1000, p=0.01, size=1000), hist=False, label='binomial')
sns.distplot(random.poisson(lam=10, size=1000), hist=False, label='poisson')
Generate a random 1x10 distribution for occurrence 2:
[1 2 1 5 2 0 1 5 2 0]
C:\Users\盧樹台>
C:\Users\盧樹台>Python P11211XXX.py
P11211XXX practices Lab113.
Visualization of poisson distribution:
C:\Users\盧樹台\Python\Scripts> UserWarning:
'distplot' is a deprecated function and will be removed in seaborn v0.14.0.
Please adapt your code to use either 'displot' (a figure-level function with similar flexibility) or 'histplot' (an axes-level function for histograms).
For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751
C:\Users\盧樹台\Python\Scripts> UserWarning:
'distplot' is a deprecated function and will be removed in seaborn v0.14.0.
Please adapt your code to use either 'displot' (a figure-level function with similar flexibility) or 'kdeplot' (an axes-level function for kernel density plots).
For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751
C:\Users\盧樹台\Python\Scripts> UserWarning:
'distplot' is a deprecated function and will be removed in seaborn v0.14.0.
Please adapt your code to use either 'displot' (a figure-level function with similar flexibility) or 'kdeplot' (an axes-level function for kernel density plots).
For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751
C:\Users\盧樹台>
C:\Users\盧樹台>Python P11211XXX.py
P11211XXX practices Lab113.
Visualization of poisson distribution:
from numpy import random
import matplotlib.pyplot as plt
import seaborn as sns
sns.distplot(random.poisson(lam=2, size=1000), kde=False)
plt.show()
print()
print("Difference between normal and poisson distribution:")
sns.distplot(random.normal(loc=50, scale=7, size=1000), hist=False, label='normal')
sns.distplot(random.poisson(lam=50, size=1000), hist=False, label='poisson')
plt.show()
print()
print("Difference between binomial and poisson distribution:")
sns.distplot(random.binomial(n=1000, p=0.01, size=1000), hist=False, label='binomial')
sns.distplot(random.poisson(lam=10, size=1000), hist=False, label='poisson')
plt.show()
print()
print("Generate a random 1x10 distribution for occurrence 2:")
x = random.poisson(lam=2, size=10)
print(x)

```
- Figure 1 (Top):** A histogram showing the distribution of Poisson random variables with  $\lambda=2$ . The x-axis ranges from 0 to 8, and the y-axis ranges from 0 to 200.
- Figure 1 (Middle):** A plot comparing a normal distribution curve (orange) and a Poisson distribution curve (blue) for  $\lambda=50$ . The x-axis ranges from 0 to 30, and the y-axis ranges from 0 to 350.
- Figure 1 (Bottom):** A plot comparing a binomial distribution curve (orange) and a Poisson distribution curve (blue) for  $n=1000, p=0.01$ . The x-axis ranges from 0 to 30, and the y-axis ranges from 0.00 to 0.10.

**Every student must do Lab113 once!**

# 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。

