주교재 “파이썬과 함께 배우는 신호와 시스템 " 의 Appendix E

보조자료

파이썬

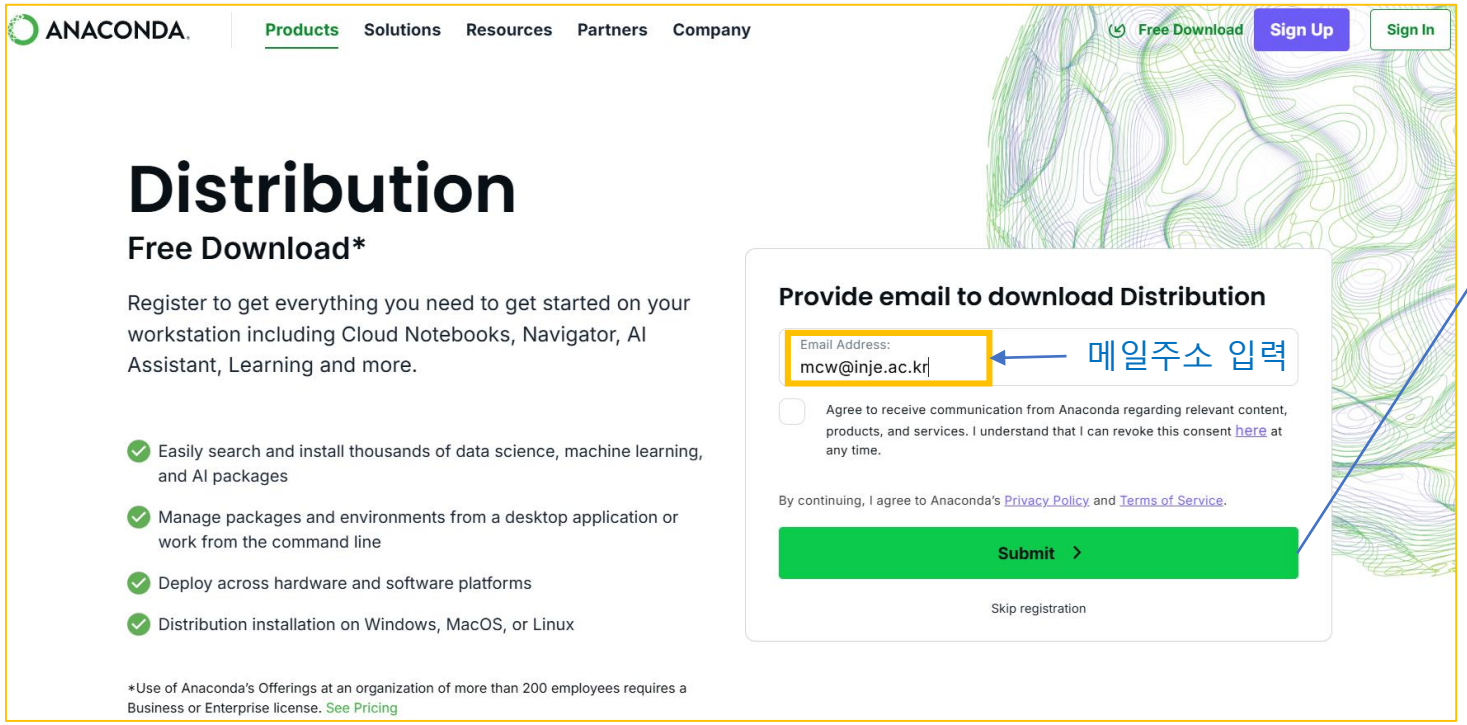
- 객체지향적 고급 범용 프로그래밍 언어 (**무료**)
- 대화형 인터프리트 언어 (즉시 결과 확인)
- 간결하고 읽기 쉬운 문법
- 플랫폼에 독립적
- 다양한 패키지 (라이브러리 활용, 결과를 그래프로 쉽게 표시)
- 최근 인공지능 개발에 활용
- 패키지 관리 및 환경관리 시스템: **Anaconda**

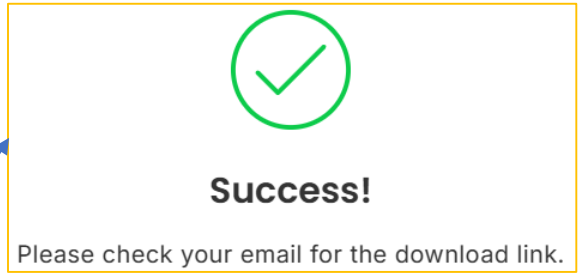
[참조] MATLAB (https://kr.mathworks.com/)

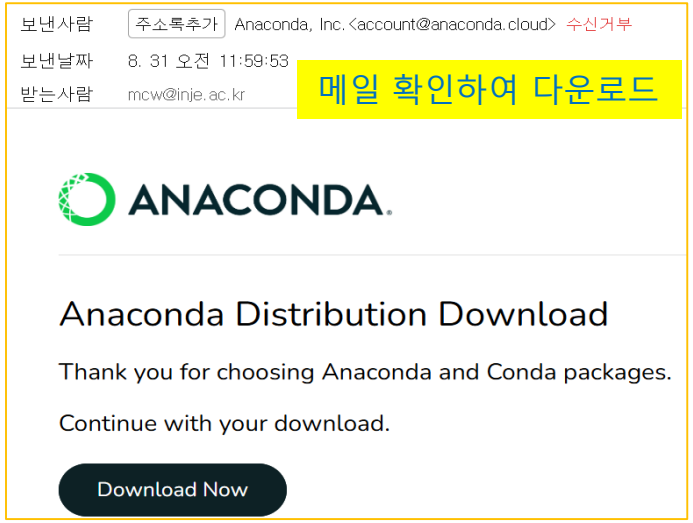
- 공학용 "Application Software Package"로 프로그래밍 언어 아님 (**유료, 고가**)
- 변수와 데이터를 입력할 수 있는, 제품화된 ToolBox를 구입하여 사용
- 수식계산에 탁월한 기능과 간편성을 제공 (결과를 그래프로 쉽게 표시)
- 2024년 현재 대학에서 지원

시작하기

- Anaconda 설치(파이썬 포함)
  - https://www.anaconda.com/download에서 PC OS에 맞게 다운 후 설치

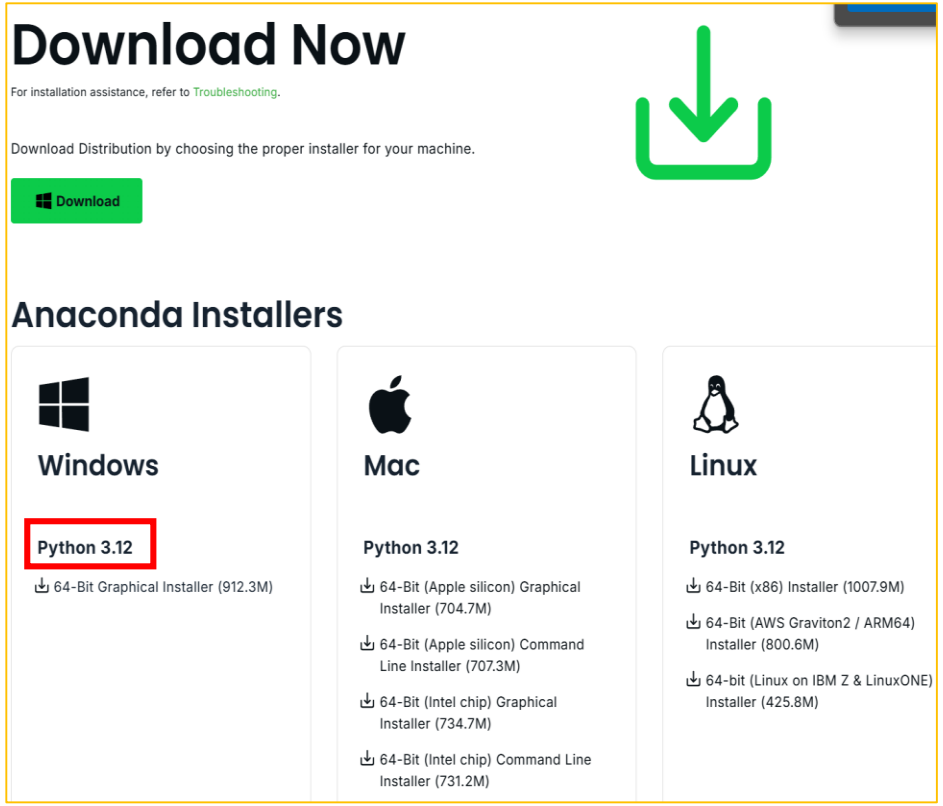






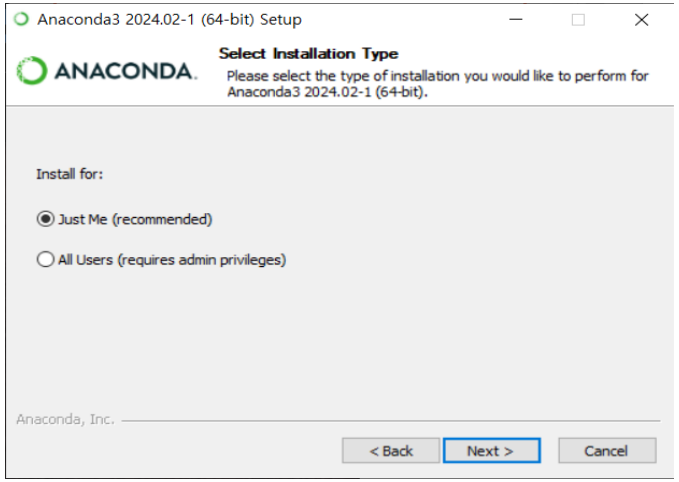
시작하기

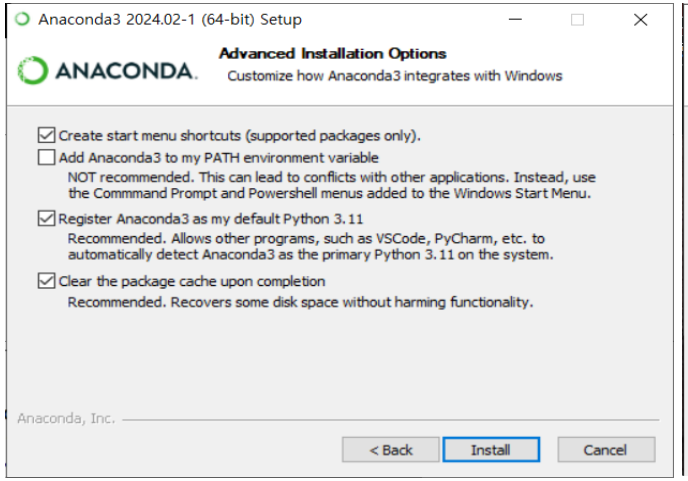
- 다운로드 후 실행

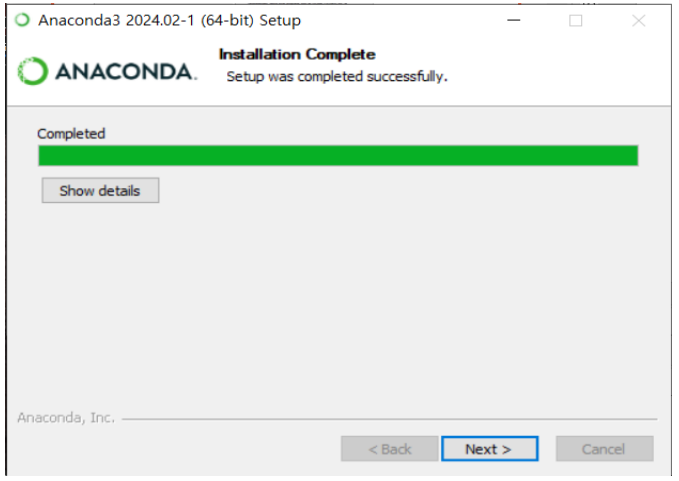


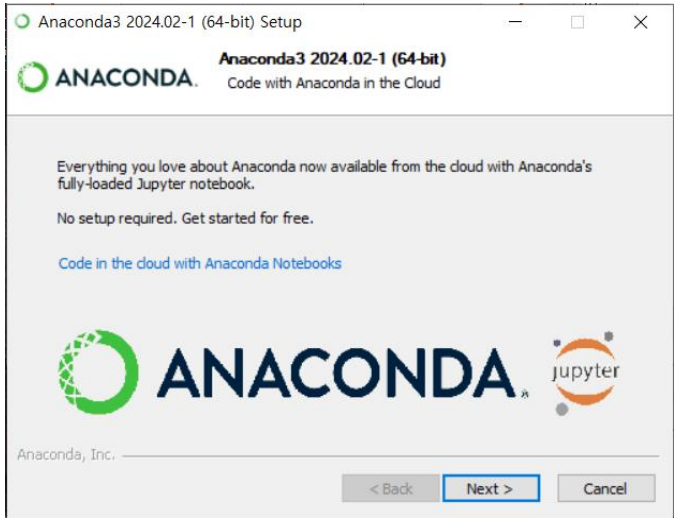
시작하기

- 계속 설치

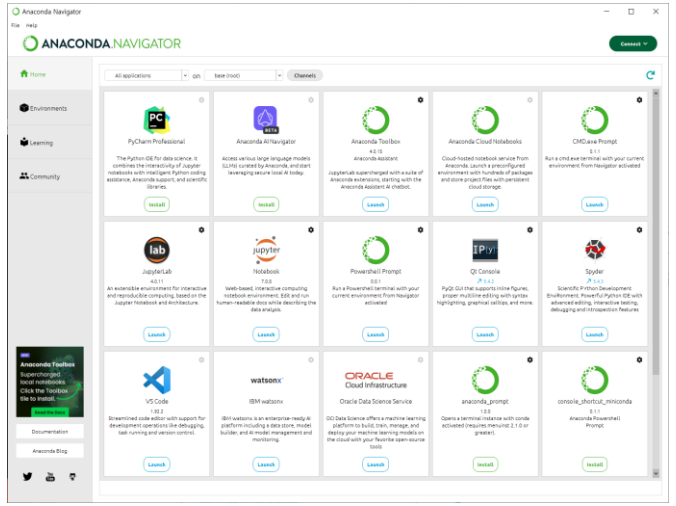

Anaconda3 2024.02-1 (64-bit) Setup
ANACONDA.
Select Installation Type
Please select the type of installation you would like to perform for Anaconda3 2024.02-1 (64-bit).
Install for:
Just Me (recommended)
All Users (requires admin privileges)
Anaconda, Inc.
< Back
Next >
Cancel


Anaconda3 2024.02-1 (64-bit) Setup
ANACONDA.
Advanced Installation Options
Customize how Anaconda3 integrates with Windows
Create start menu shortcuts (supported packages only).
Add Anaconda3 to my PATH environment variable
NOT recommended. This can lead to conflicts with other applications. Instead, use the Commmand Prompt and Powershell menus added to the Windows Start Menu.
Register Anaconda3 as my default Python 3.11
Recommended. Allows other programs, such as VSCode, PyCharm, etc. to automatically detect Anaconda3 as the primary Python 3.11 on the system.
Clear the package cache upon completion
Recommended. Recovers some disk space without harming functionality.
Anaconda, Inc.
< Back
Install
Cancel


Anaconda3 2024.02-1 (64-bit) Setup
ANACONDA.
Installation Complete
Setup was completed successfully.
Completed
Show details
Anaconda, Inc.
< Back
Next >
Cancel

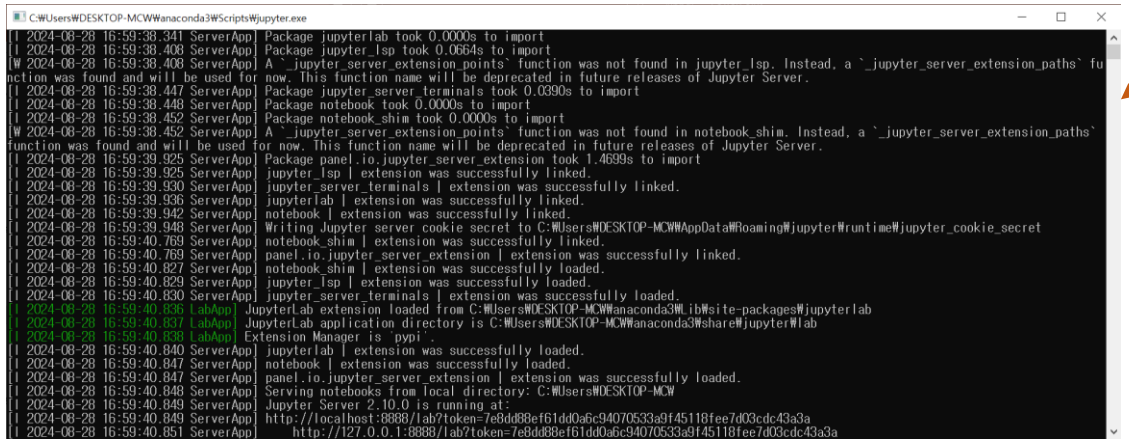

Anaconda3 2024.02-1 (64-bit) Setup
ANACONDA.
Anaconda3 2024.02-1 (64-bit)
Code with Anaconda in the Cloud
Everything you love about Anaconda now available from the cloud with Anaconda's fully-loaded Jupyter notebook.
No setup required. Get started for free.
Code in the cloud with Anaconda Notebooks
ANACONDA.
jupyter
Anaconda, Inc.
< Back
Next >
Cancel

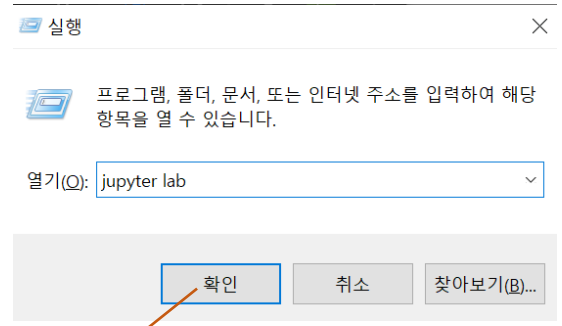

Anaconda3 2024.02-1 (64-bit) Setup
ANACONDA.
Completing Anaconda3 2024.02-1 (64-bit) Setup
Thank you for installing Anaconda Distribution.
Here are some helpful resources to get you started. We recommend you bookmark the 'Getting Started with Anaconda Distribution' link so you can refer back to it later.
Launch Anaconda Navigator
Getting Started with Anaconda Distribution
< Back
Finish
Cancel

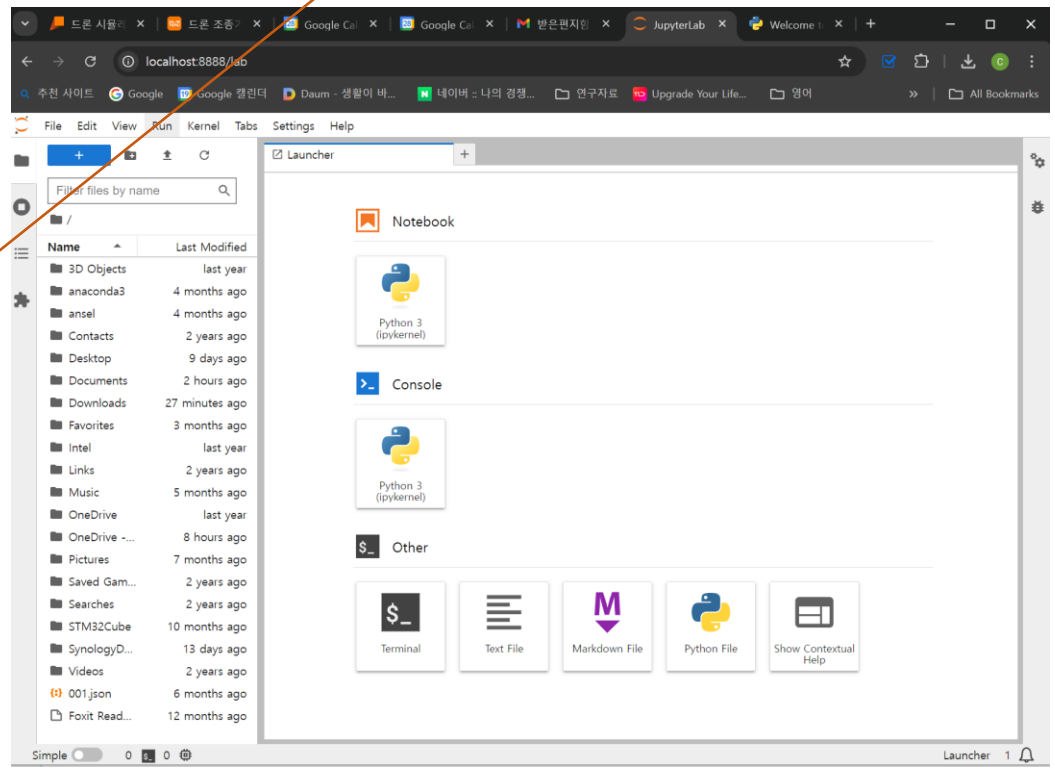

ANACONDA.NAVIGATOR
PyCharm Professional
Anaconda AI Navigator
Anaconda Toolbox
Anaconda Cloud Notebooks
CMD.exe Prompt
JupyterLab
Notebook
Powershell Prompt
Qt Console
Spyder
VS Code
IBM watsonx
Oracle Data Science Service
anaconda_prompt
console_shortcut_miniconda

시작하기

- 통합개발환경(IDE): **Jupyter Lab**
  - 많은 IDE: Visual Studio, VS code,
  - ipython shell 환경 제공
- 설치
  - 윈도우에서 WINDOW+R↓ → 실행 창
  - 실행 창에 'jupyter lab'을 입력하고 확인

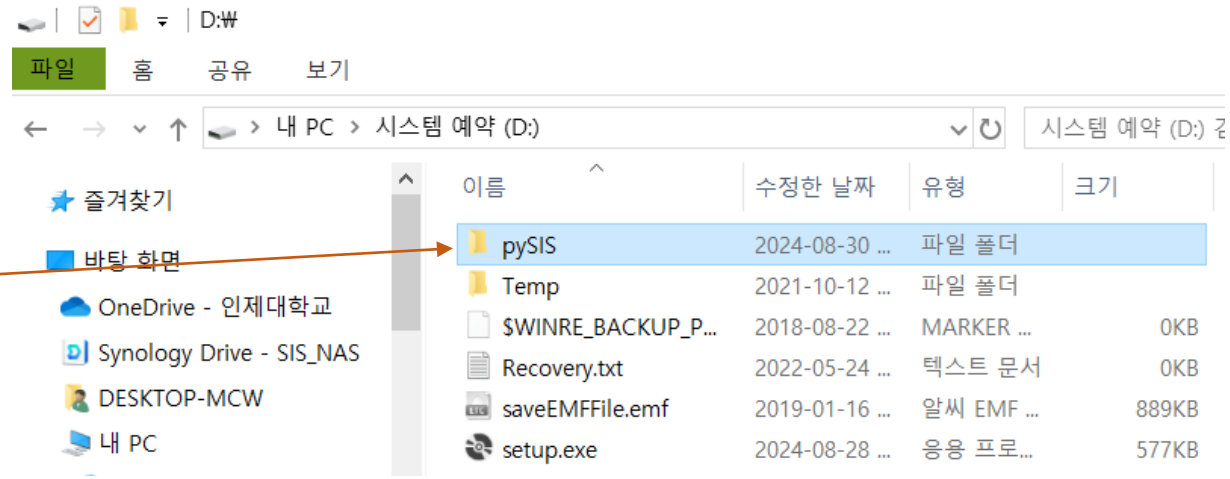






시작하기

- **작업 폴더 만들기**
  예) D:₩mkdir pySIS
  D:₩pySIS



- **Jupyter Lab 경로 변경**
  - 설정된 폴더(D:₩pySIS)에서 jupyter lab 시작하게 함

  [검색 및 참조]

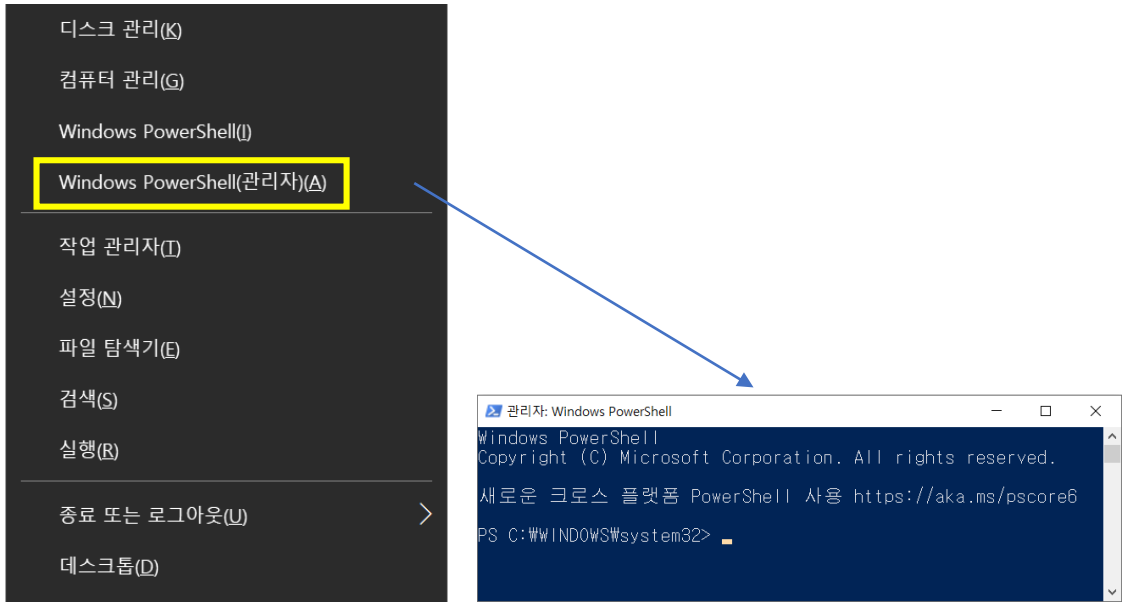
  https://velog.io/@yellofi/%ED%8C%8C%EC%9D%B4%EC%8D%AC%EC%A3%BC%ED%94%BC%ED%84%B0-Jupyter-Lab-%EA%B2%BD%EB%A1%9C-%EB%B3%80%EA%B2%BD

  - 명령창에서 jupyter lab --generate-config
    - C:₩사용자(users)₩(사용자 폴더 이름)₩.jupyter₩jupyter_config.py 생성
    - C.ServerApp.notebook_dir=‘’ 찾아 좌 그림으로 수정

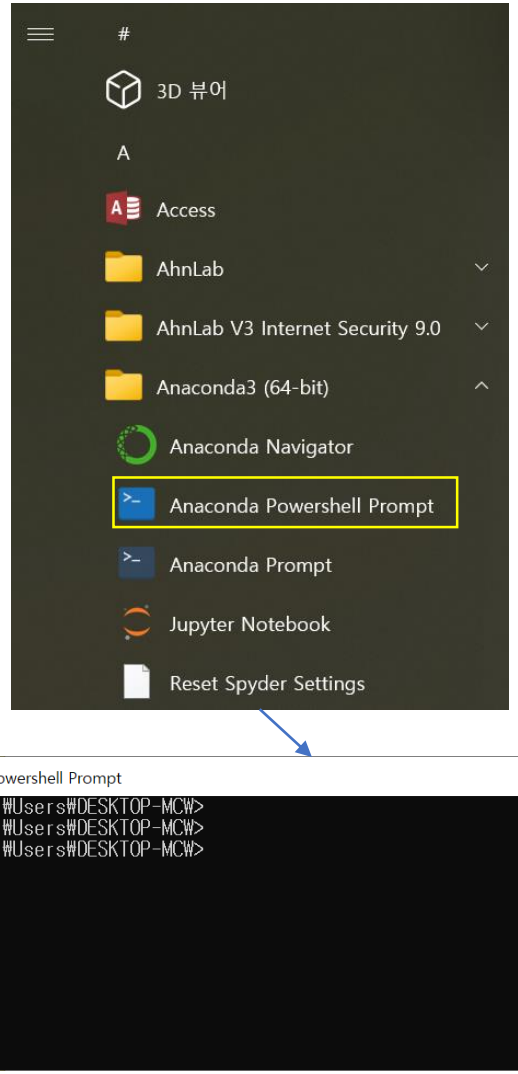
```
#  Default: ''
c.ServerApp.notebook_dir = 'D:\pySIS'
```

파이썬 위젯 사용방법

- ipywidget 모듈 설치
  - **윈도우 키+X** → 팝업 창
    - Windows PowerShell(관리자)(A)
    - PowerShell 창 (권장)



또는
시작메뉴에서 Anaconda3 (64-bit)에서
Anaconda Powershell Prompt 클릭



설치방법

> conda install –c conda-forge ipympl

> conda install nodejs

```
PS C:\Users\DESKTOP-MCW> conda install -c conda-forge ipympl
Channels:
 - conda-forge
 - defaults
Platform: win-64
Collecting package metadata (repodata.json): done
Solving environment: done

## Package Plan ##

  environment location: C:\Users\DESKTOP-MCW\anaconda3

  added / updated specs:
    - ipympl


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    ca-certificates-2024.7.4   |       h56e8100_0         151 KB  conda-forge
    certifi-2024.7.4           |     pyhd8ed1ab_0         156 KB  conda-forge
    ipympl-0.9.4               |     pyhd8ed1ab_0         209 KB  conda-forge
    openssl-3.3.1              |       h2466b09_3         8.0 MB  conda-forge
    ucrt-10.0.22621.0          |       h57928b3_0         1.2 MB  conda-forge
done
```

```
PS C:\Users\DESKTOP-MCW> conda install nodejs
Channels:
 - defaults
 - conda-forge
Platform: win-64
Collecting package metadata (repodata.json): done
Solving environment: done

## Package Plan ##

  environment location: C:\Users\DESKTOP-MCW\anaconda3

  added / updated specs:
    - nodejs


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    conda-24.7.1               |  py311haa95532_0         1.2 MB
    frozendict-2.4.2           |  py311haa95532_0          38 KB
    nodejs-18.18.2             |       haa95532_0        24.2 MB
    ------------------------------------------------------------
                                           Total:        25.6 MB
```

```
The following NEW packages will be INSTALLED:

  frozendict         pkgs/main/win-64::frozendict-2.4.2-py311haa95532_0
  nodejs             pkgs/main/win-64::nodejs-18.18.2-haa95532_0

The following packages will be UPDATED:


The following packages will be SUPERSEDED by a higher-priority channel:

  certifi            conda-forge/noarch::certifi-2024.7.4-~ --> pkgs/main/win-64::certifi-2024.7.4-py311haa95532_0


Proceed ([y]/n)? y


Downloading and Extracting Packages:

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```

설치방법 (jupyterlab-manager)

> Jupyter labextension install @jupyter-widgets/jupyterlab-manager

```
PS C:\Users\DESKTOP-MCW> jupyter labextension install @jupyter-widgets/jupyterlab-manager
(Deprecated) Installing extensions with the jupyter labextension install command is now deprecated and will be removed
 in a future major version of JupyterLab.

Users should manage prebuilt extensions with package managers like pip and conda, and extension authors are encouraged
 to distribute their extensions as prebuilt packages
Building jupyterlab assets (production, minimized)
```

설치방법 (jupyter-matplotlib)

> jupyter labextension install jupyter-matplotlib

```
PS C:\Users\DESKTOP-MCW> conda install jupyter-matplotlib
Channels:
 - defaults
 - conda-forge
Platform: win-64
Collecting package metadata (repodata.json): done
Solving environment: failed

PackagesNotFoundError: The following packages are not available from current channels:

  - jupyter-matplotlib

Current channels:

  - defaults
  - https://conda.anaconda.org/conda-forge/win-64
  - https://conda.anaconda.org/conda-forge/noarch

To search for alternate channels that may provide the conda package you're
looking for, navigate to

    https://anaconda.org

and use the search bar at the top of the page.
```

- ipywidget 참고 사이트

  https://github.com/matplotlib/jupyter-matplotlib

Voila

- Voila란?
  - 원래 Dashboard 형성이 목적 → 노트북에서 Dashboard로 바로 변환
  - NoteBook 기반 코드의 프로토타입을 쉽게 만들어주는 라이브러리
  - 단 시간 내에 **간단한** 프로토타입 작성 가능해서 자주 활용

- Voila 장점
  - Notebook에서 별도 코드 추가없이 실행
  - Jupyter Notebook 결과를 쉽게 웹 형태로 띄울 수 있음

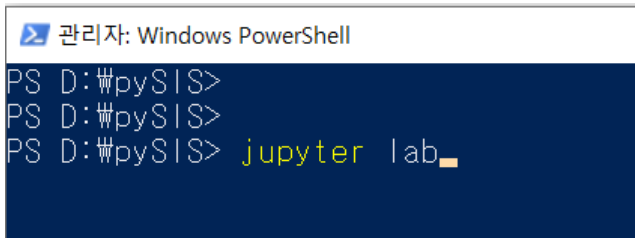
Voila 설치 및 설정

- ipywidget 사용에 편리
- Voila를 사용하기 위한 설치
  - > conda install –c conda-forge voila
  - > ~~jupyter labextension install @jupyter-voila/jypyterlab-preview~~
  - > conda install @jupyter-voila/jupyterlab-preview

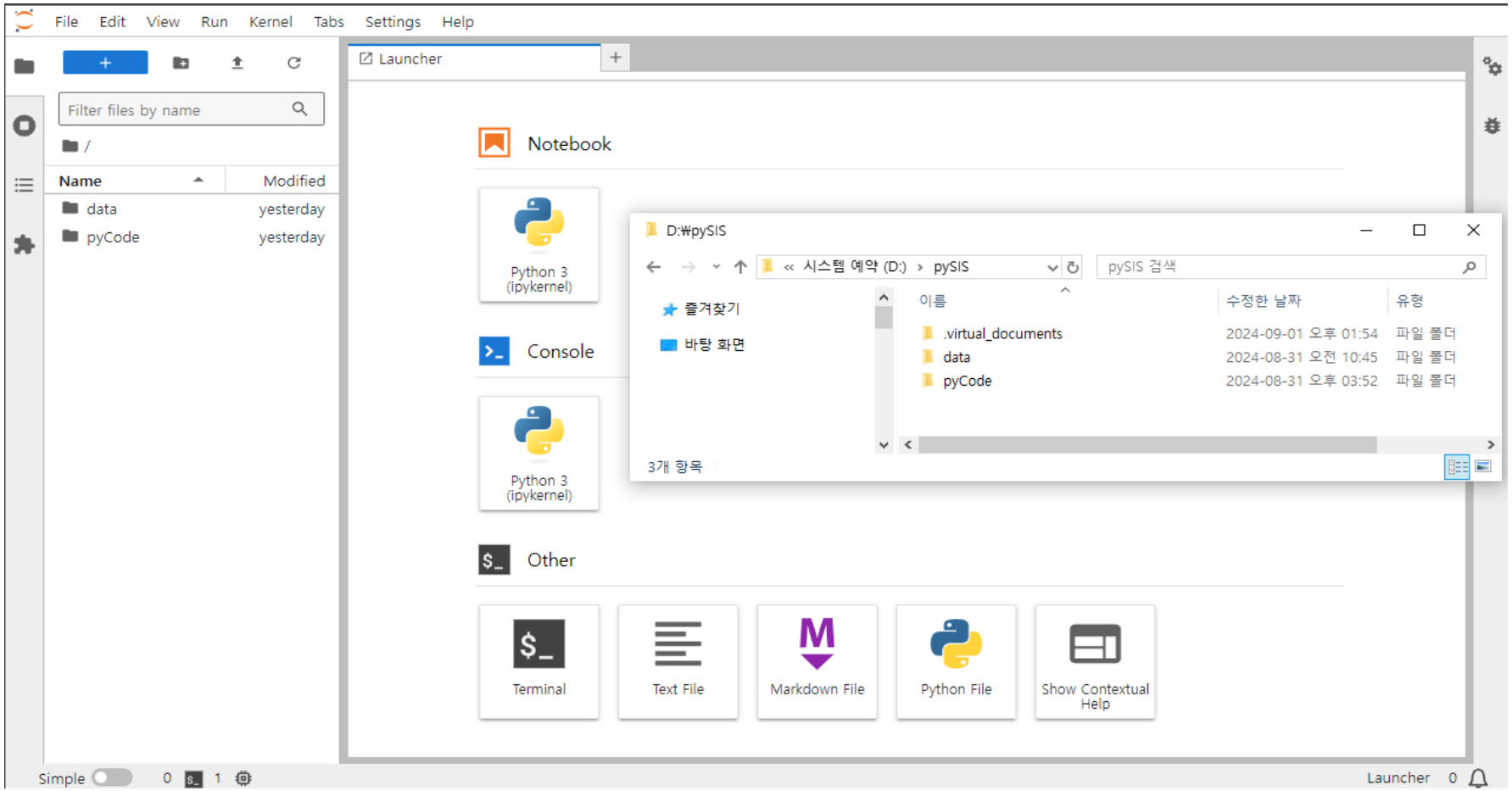
[참조] voila에 대한 상세한 사항
https://github.com/voila-dashboards/voila

Jupyter Lab 시작

- 명령 창 또는 PowerShell

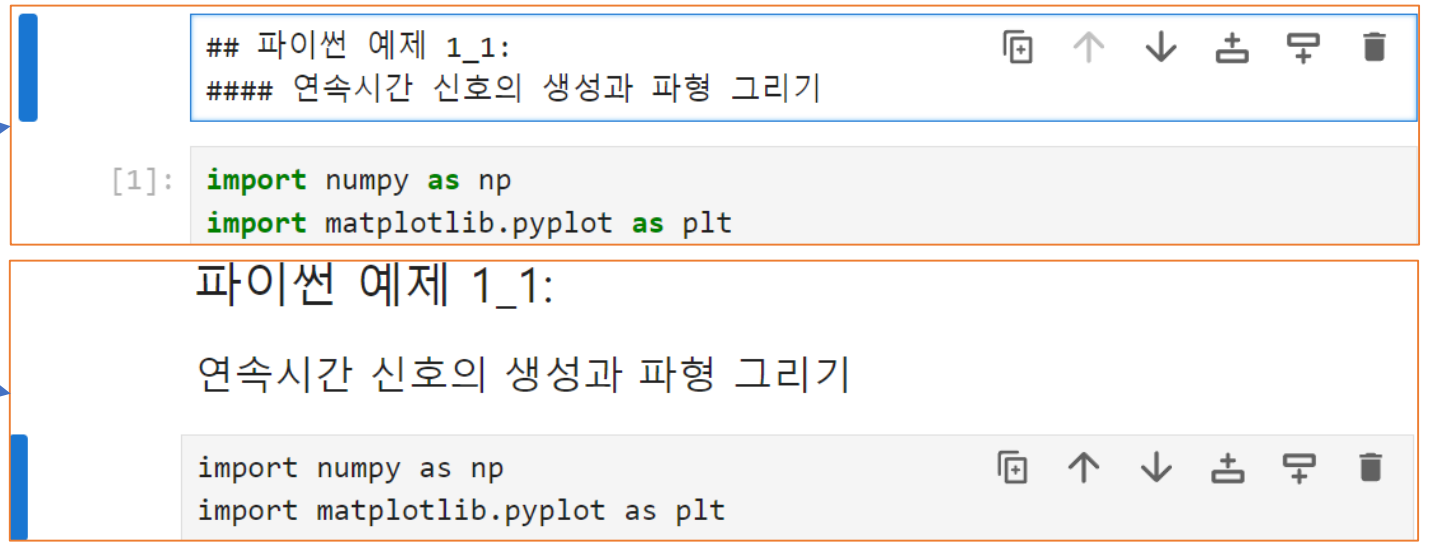


  - 저장된 코드 편집
    - 해당 폴더로 이동
  - 새 코드 편집
    - 우측 Launcher 아이콘 누름



Jupyter Lab 사용 및 종료

- 새 파일 **이름.확장자** = **untitled.ipynb**
- Jupyter lab 셀 사용
  - code 수정 및 실행
  - Markdown 타입
    - 입력:
    - 출력:



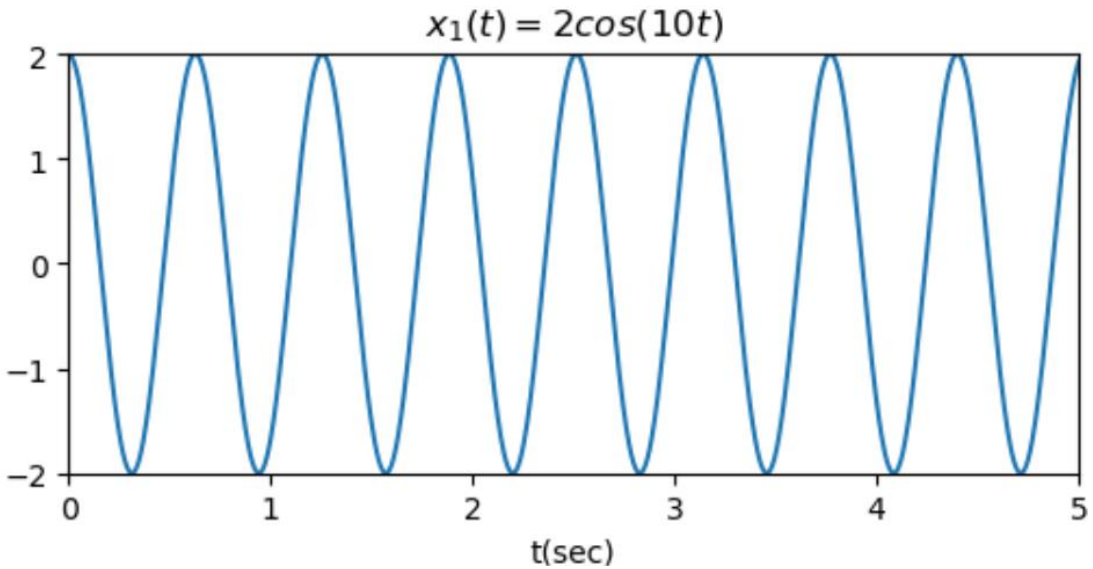
- Jupyter lab 종료
  - 명령 프롬프트 혹은 터미널에서 CTRL+C ↓
  - 파일 메뉴에서 log out

사용 예

[1]:
```
import numpy as np
import matplotlib.pyplot as plt
```

[2]:
```
t = np.linspace(0, 5, 1001)
x1 = 2 * np.cos(10*t)
fig, ax = plt.subplots( figsize=(6, 2.5) )
ax.plot(t,x1)
ax.set_xlim(0,5)
ax.set_ylim(-2.0, 2.0)
ax.set_xlabel( 't(sec)')
ax.set_title('$x_1(t) = 2cos(10t)$')
```

[2]:
```
Text(0.5, 1.0, '$x_1(t) = 2cos(10t)$')
```



[4]:
```
t2      = np.arange(-1, 3, 0.001)
x2      = np.exp(-t2) * (t2>0)
fig, ax = plt.subplots( figsize=(6, 2.5) )
ax.plot(t2, x2)
ax.set_xlim(-1,3)
ax.set_xlabel('t(sec)')
ax.set_title('$x_2(t)=e^{-t}u(t)$')
```

[4]:
```
Text(0.5, 1.0, '$x_2(t)=e^{-t}u(t)$')
```