

CS 111—Intro to Computational Science

Discussion Section Week 1

About Us

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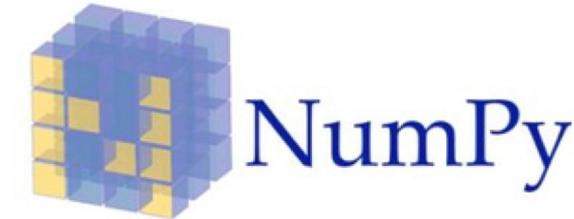
Discussion Section Objectives

- ❑ Install Anaconda on your computer
- ❑ Witness the power of matplotlib
- ❑ Learn how to use Gradescope
- ❑ Warm up to LaTeX

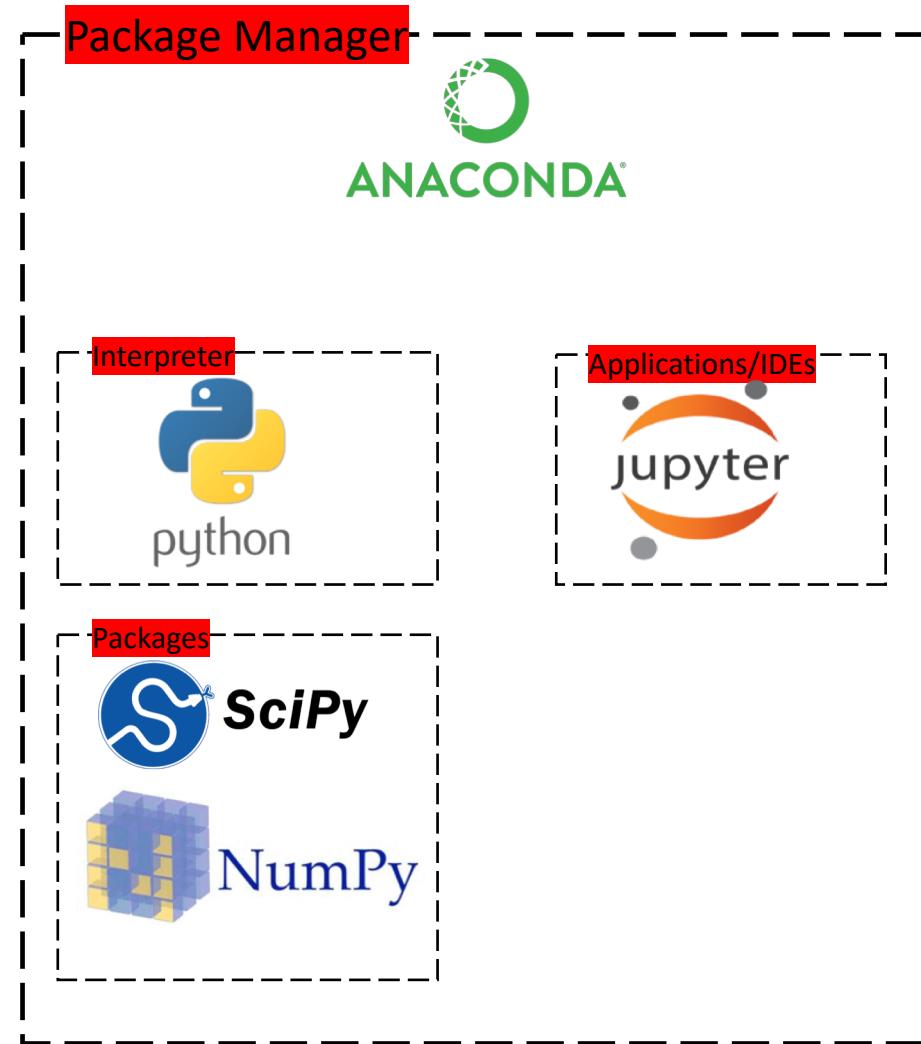
What is Anaconda?



What is Anaconda?

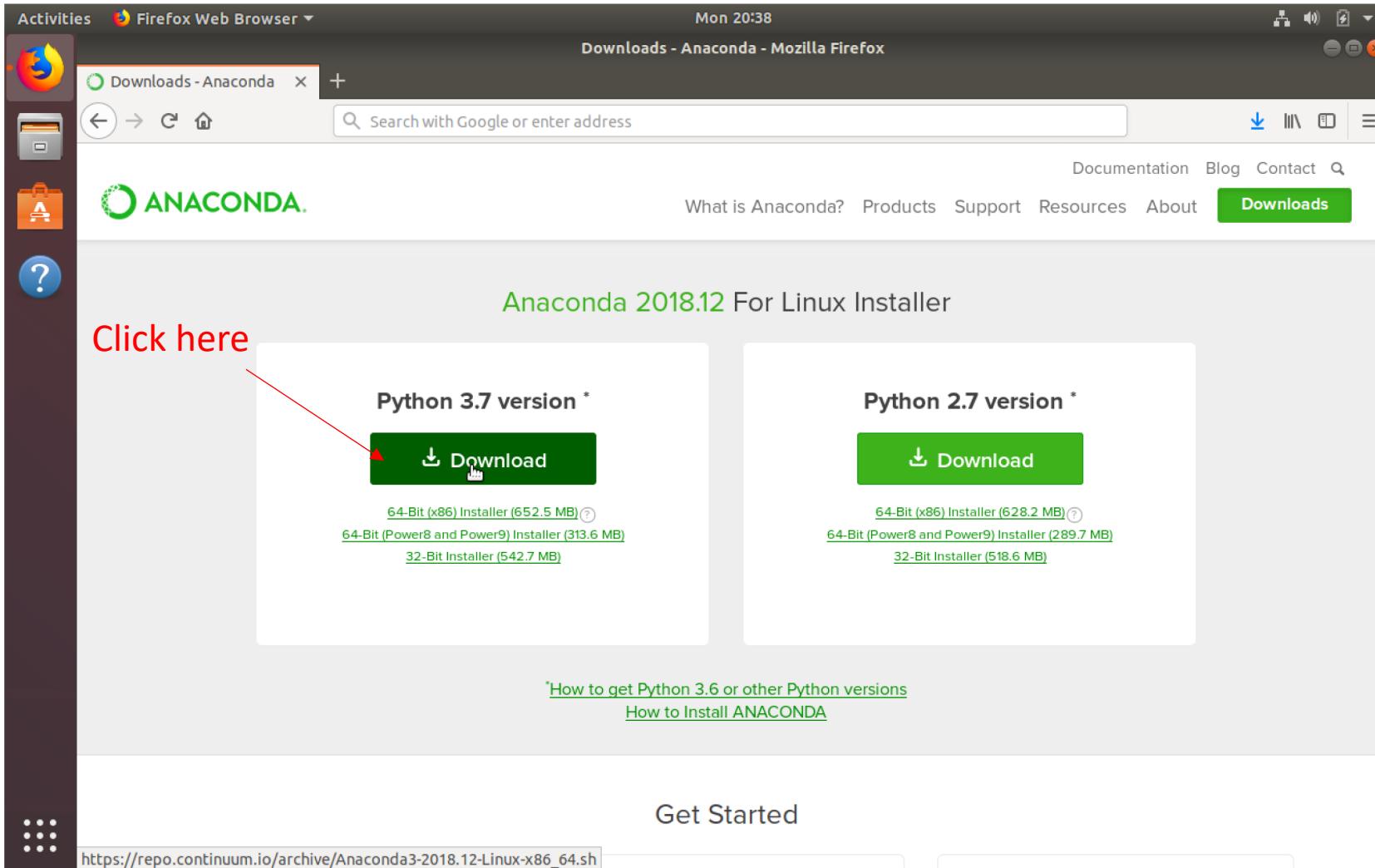


The General Hierarchy

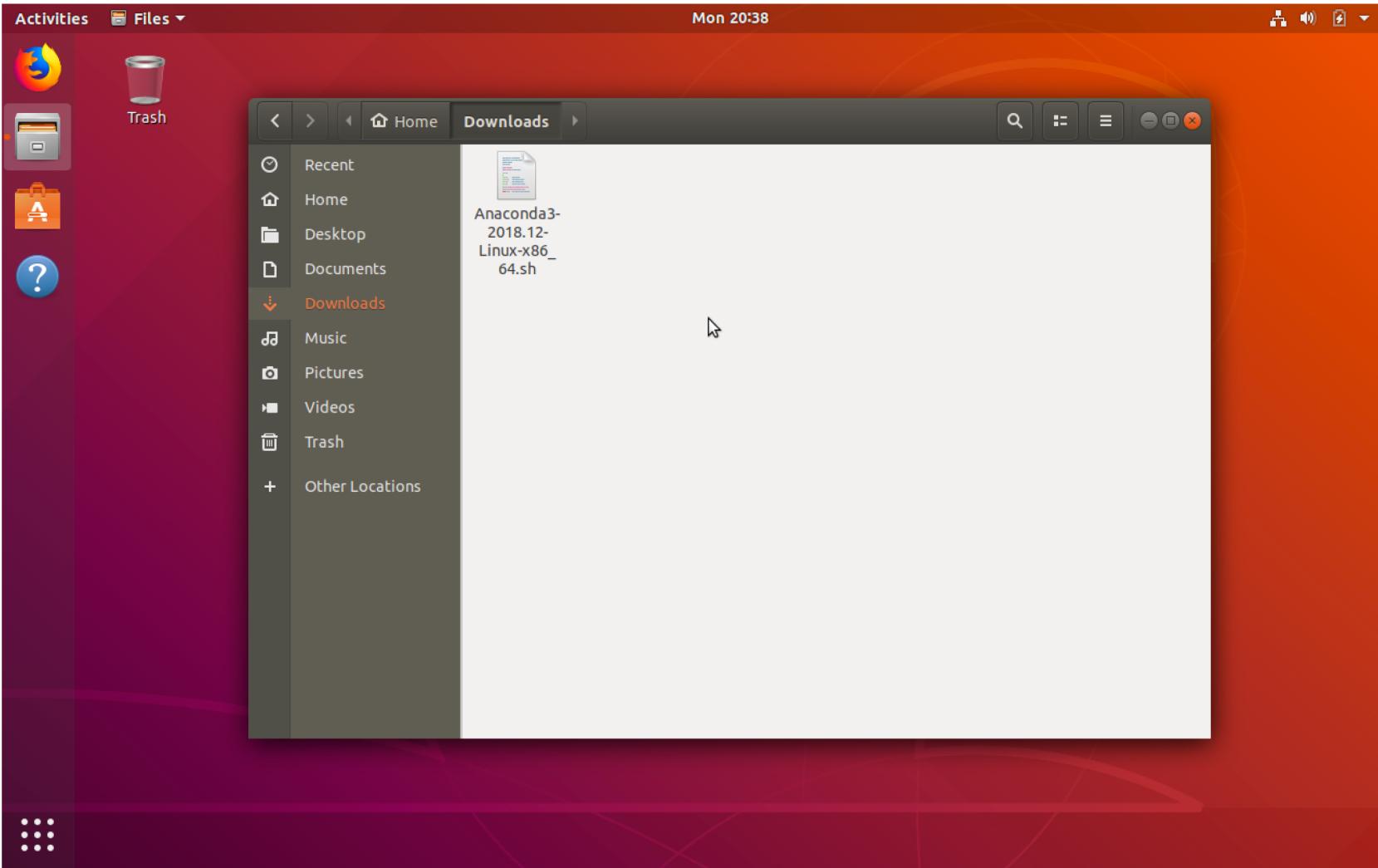


Installing Anaconda Ubuntu 18

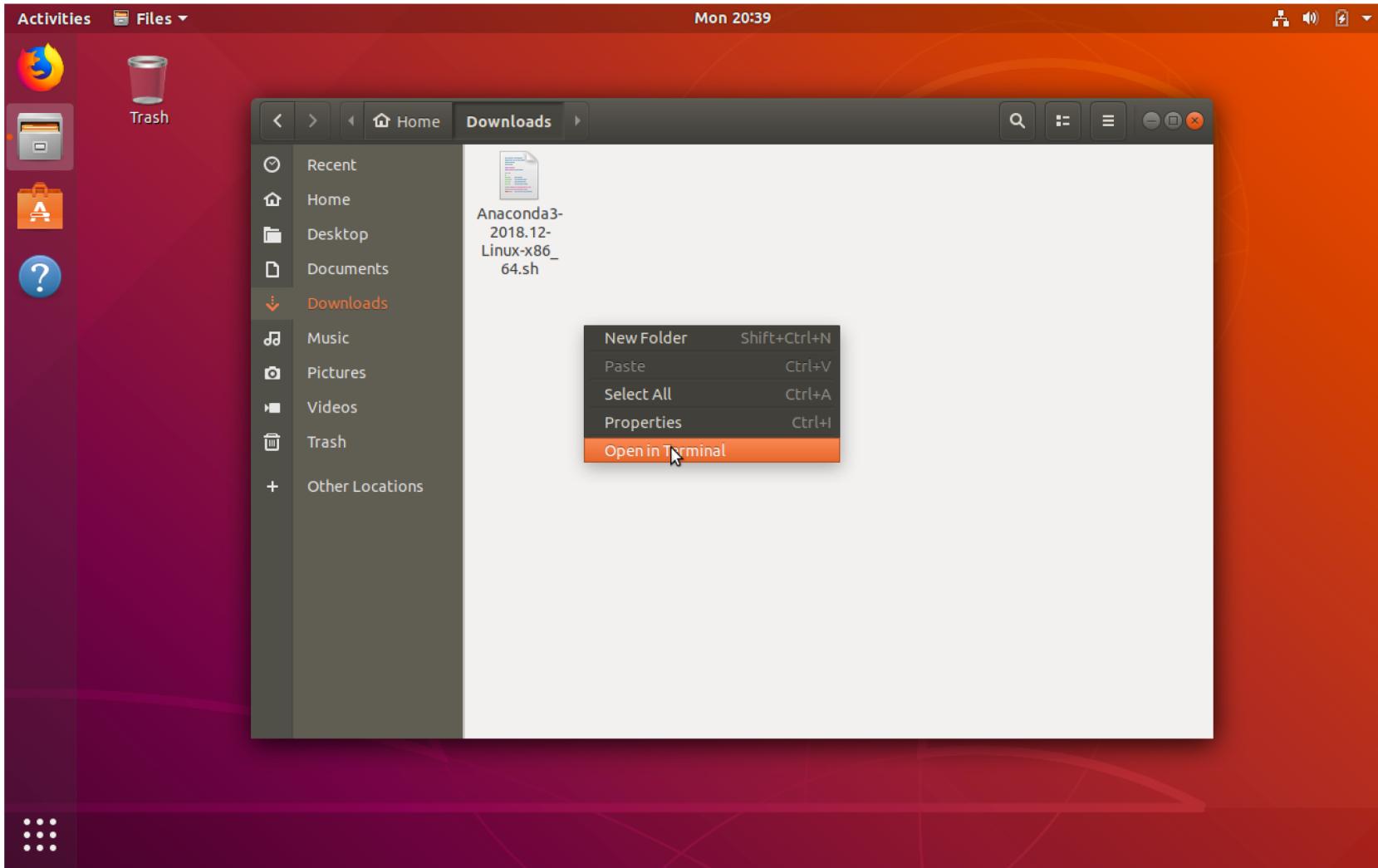
Go to the Anaconda Download Page



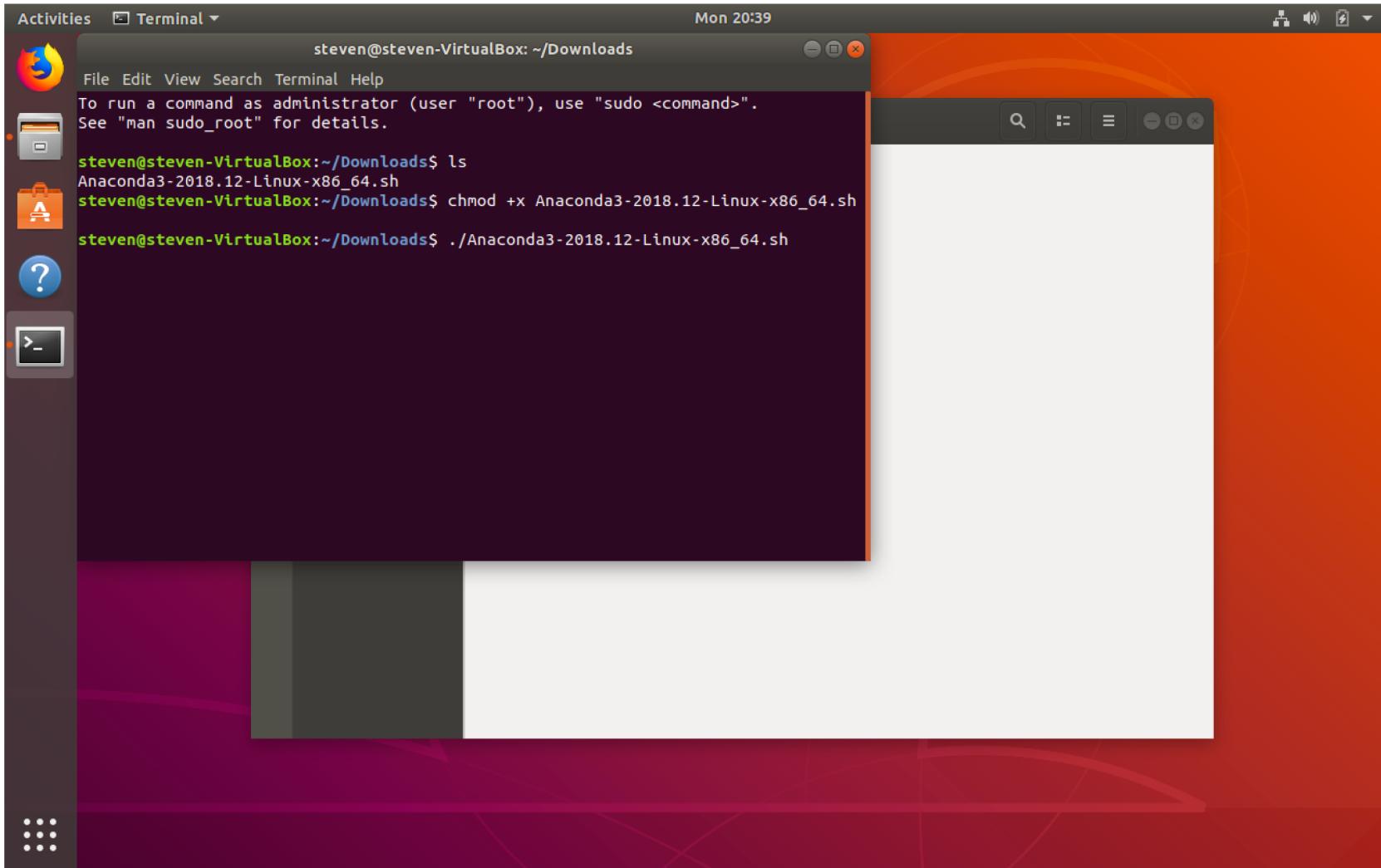
Open the ~/Downloads folder



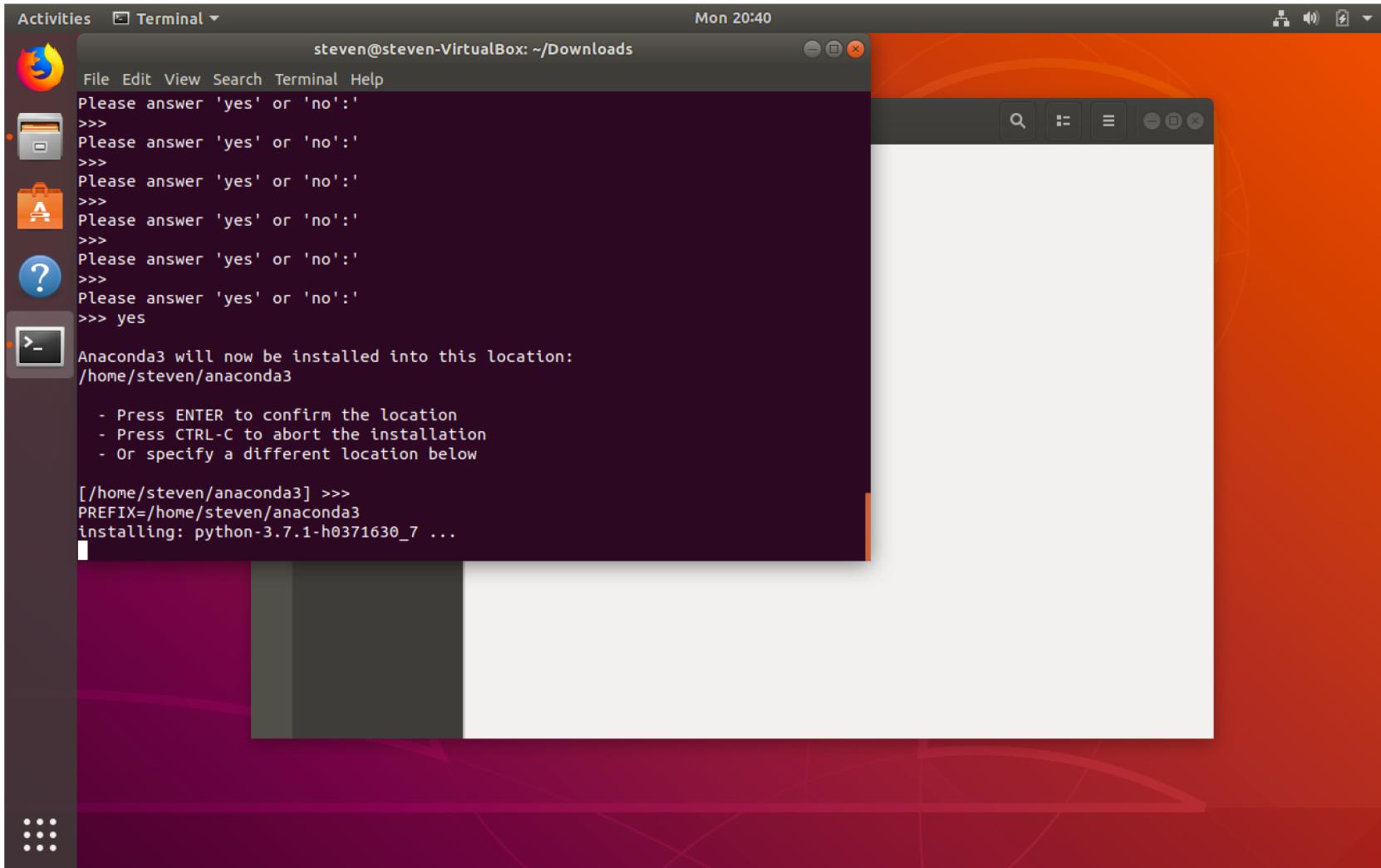
Right Click Open Terminal



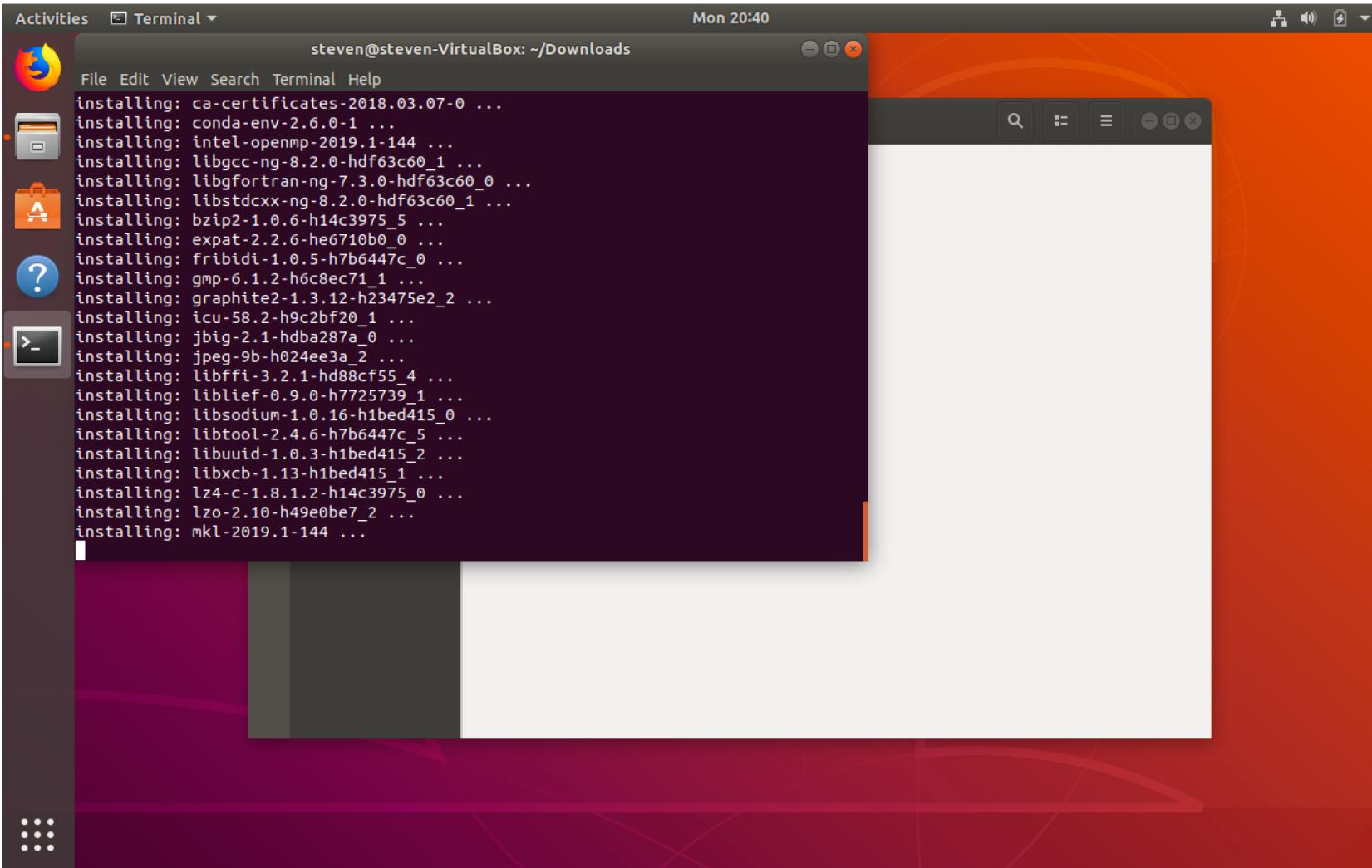
Change Permissions/Run Installer



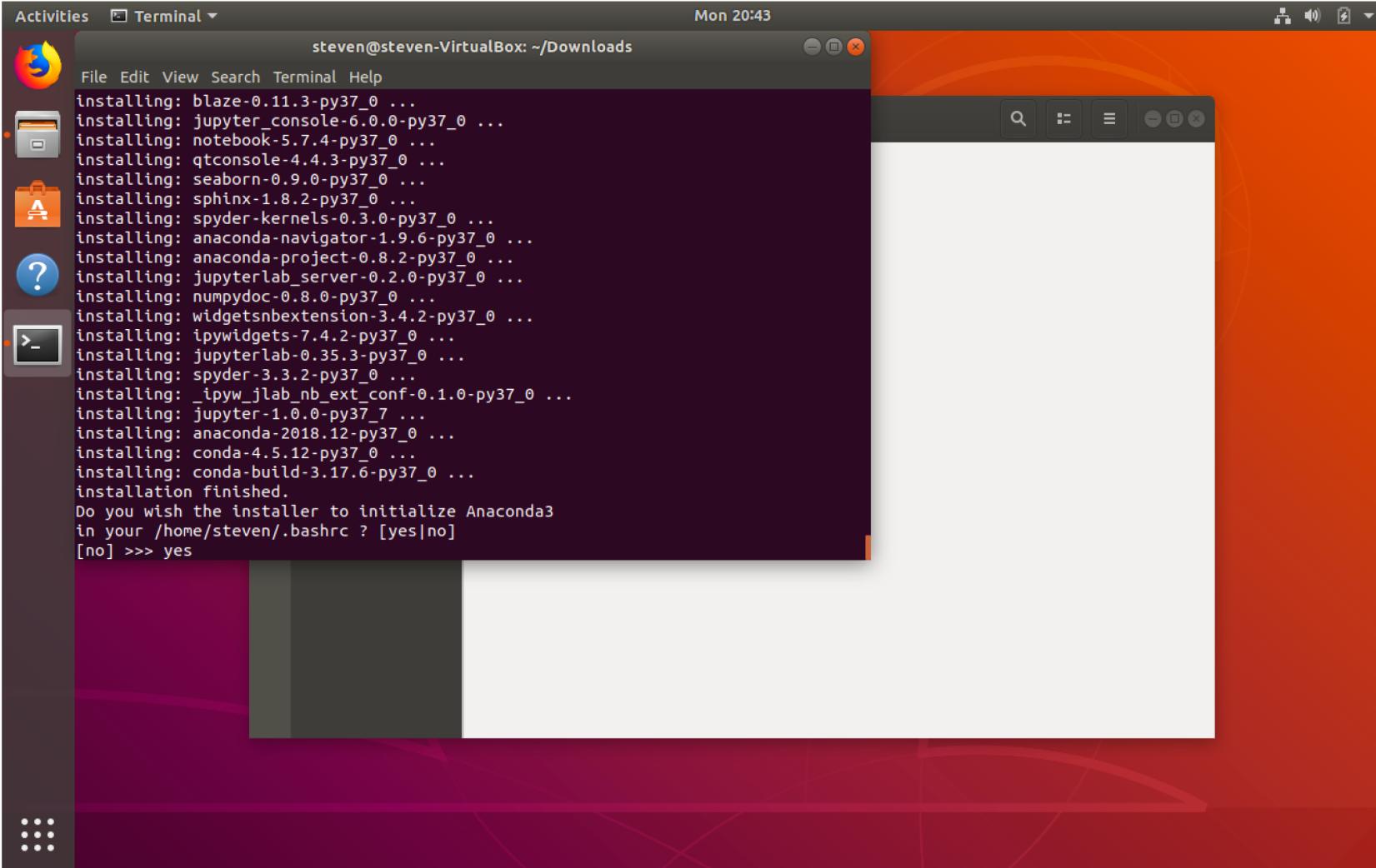
Follow Instructions



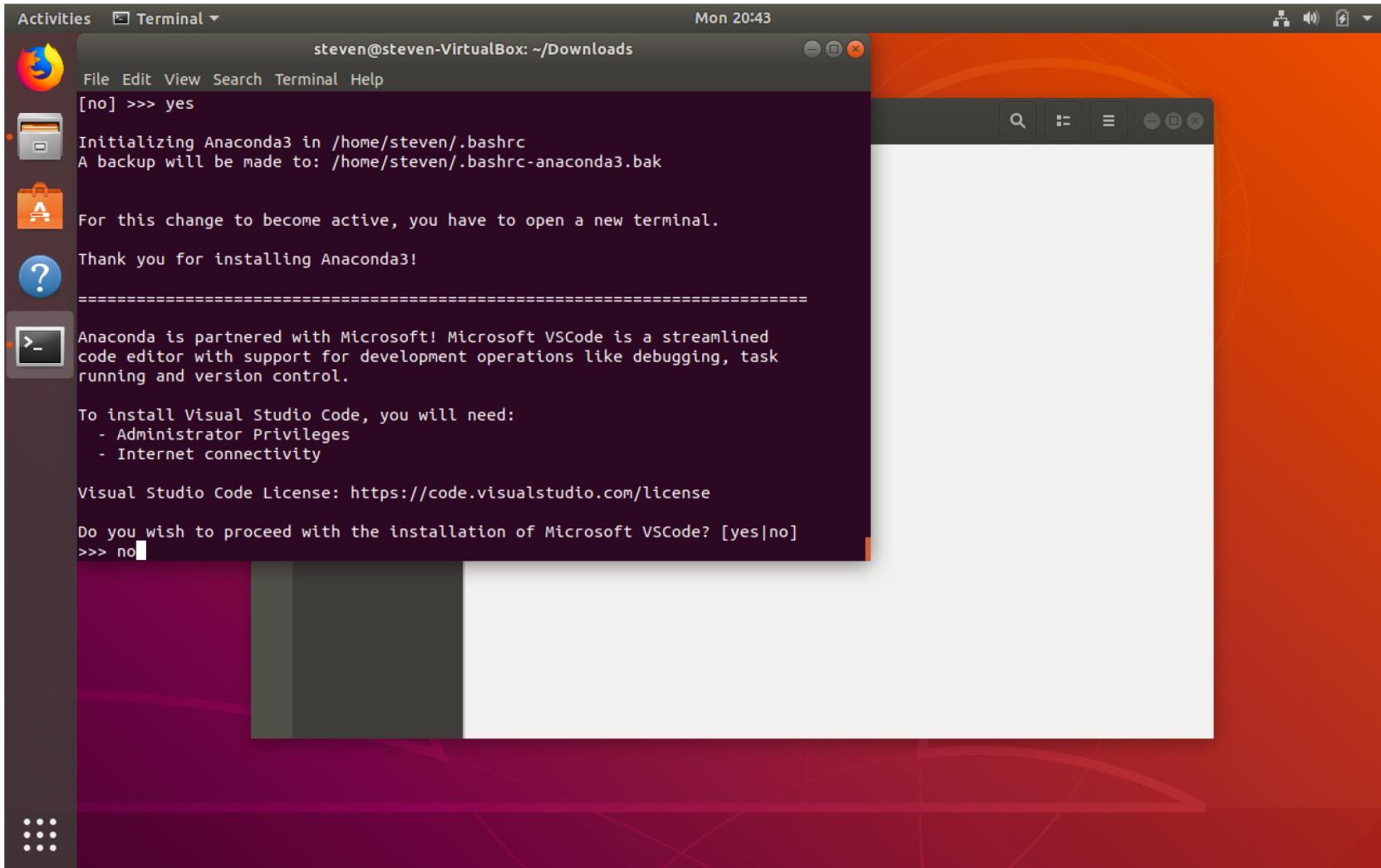
Grab your favorite book and relax for a while



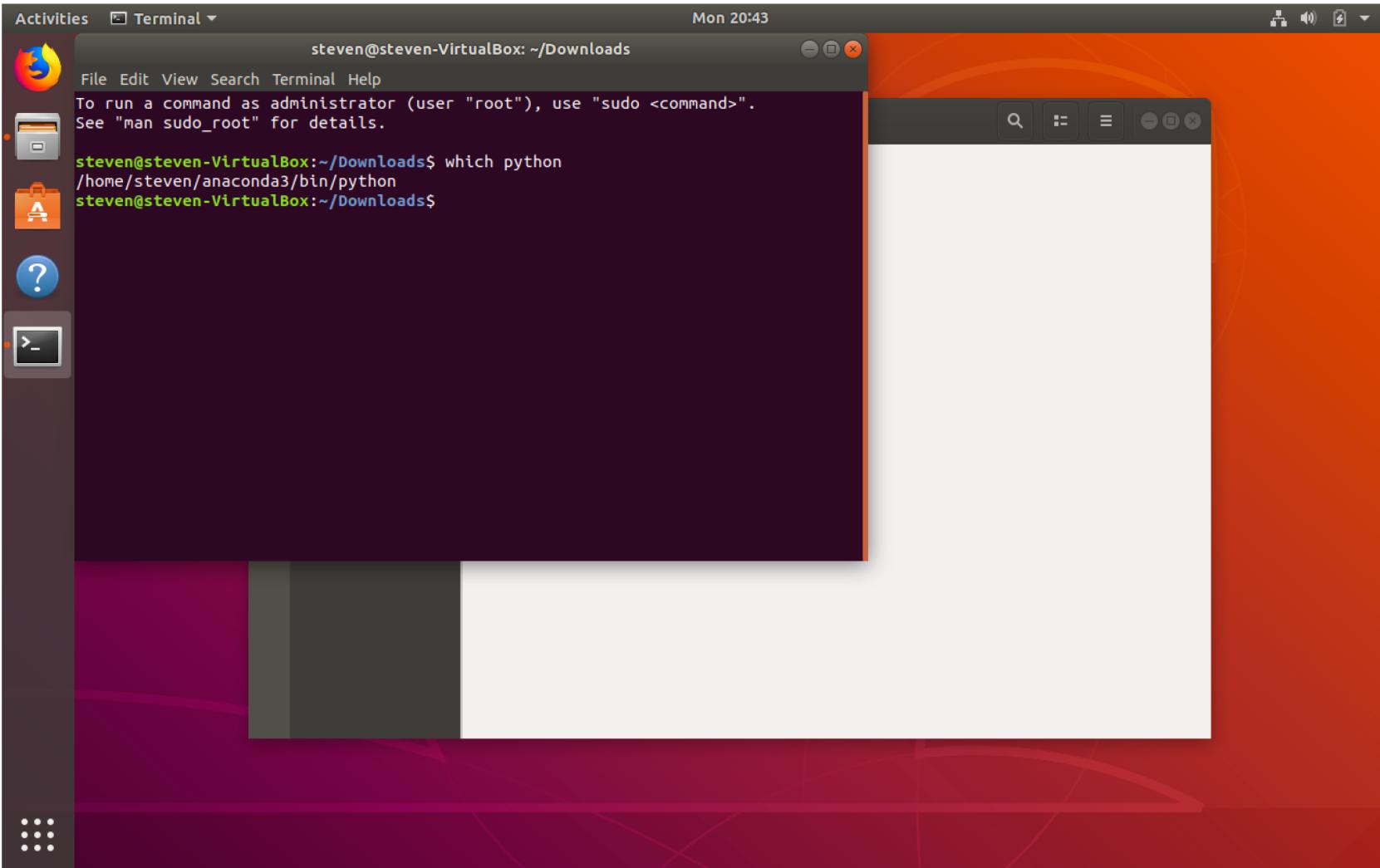
Set as default interpreter



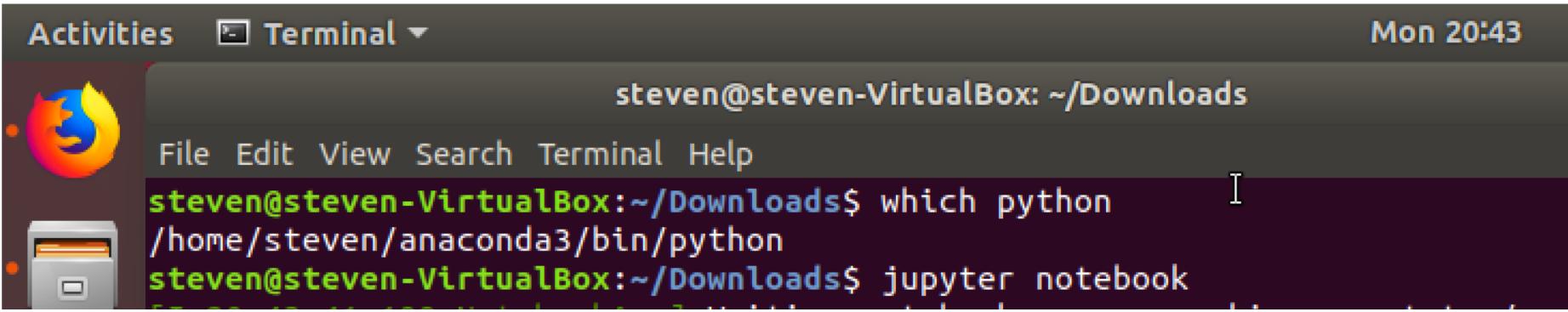
You do not need VSCode



Restart the terminal and check installation



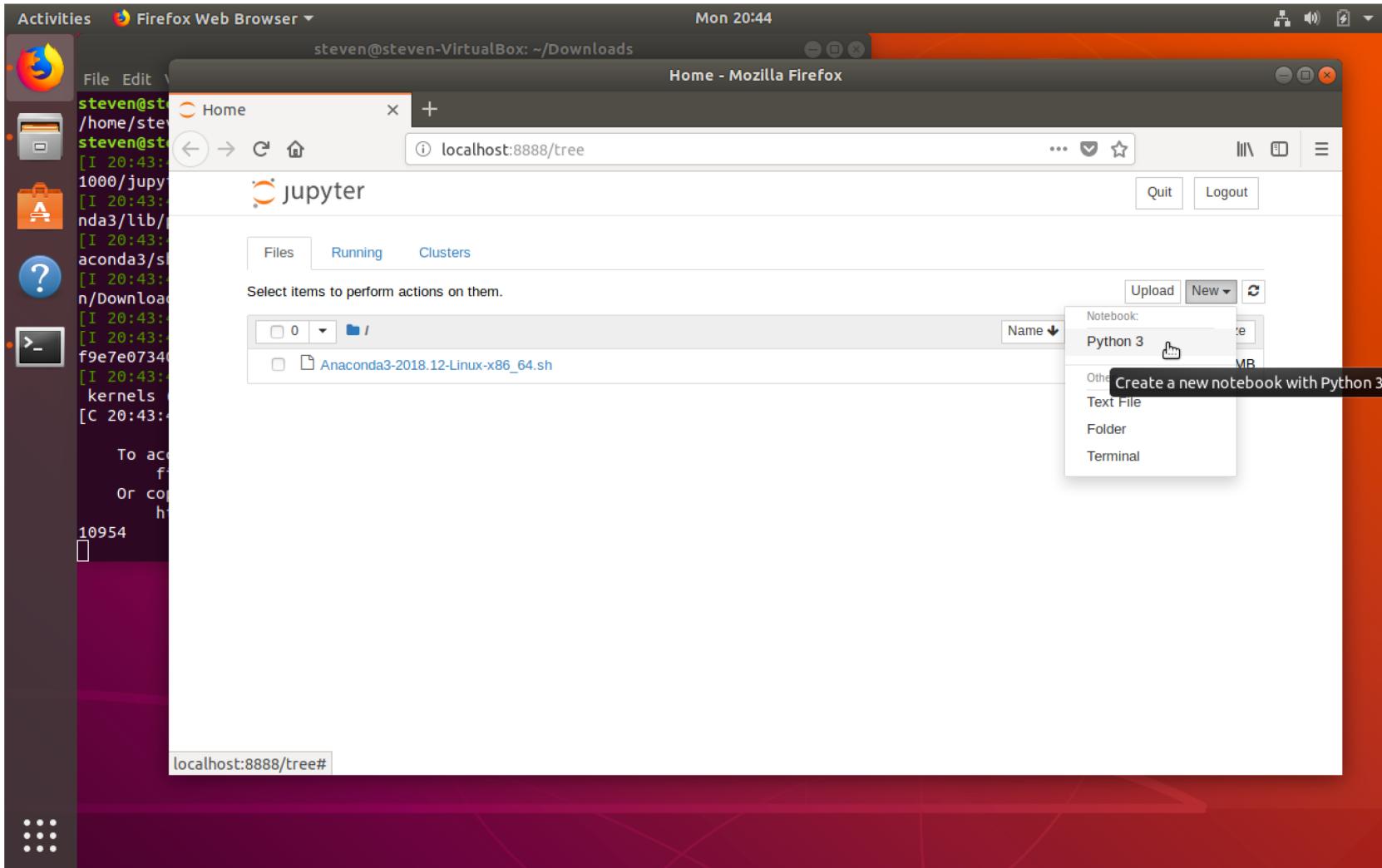
Launch Jupyter

A screenshot of an Ubuntu desktop environment. At the top, there's a dark header bar with the text "Activities" and "Terminal". On the right side of the header, it shows the date "Mon 20:43". Below the header, there's a dock with icons for the Dash (Ubuntu logo), a browser (Firefox), and a file manager (Nautilus). A terminal window is open in the foreground. The title bar of the terminal says "steven@steven-VirtualBox: ~/Downloads". The terminal itself has a dark background and contains the following text:

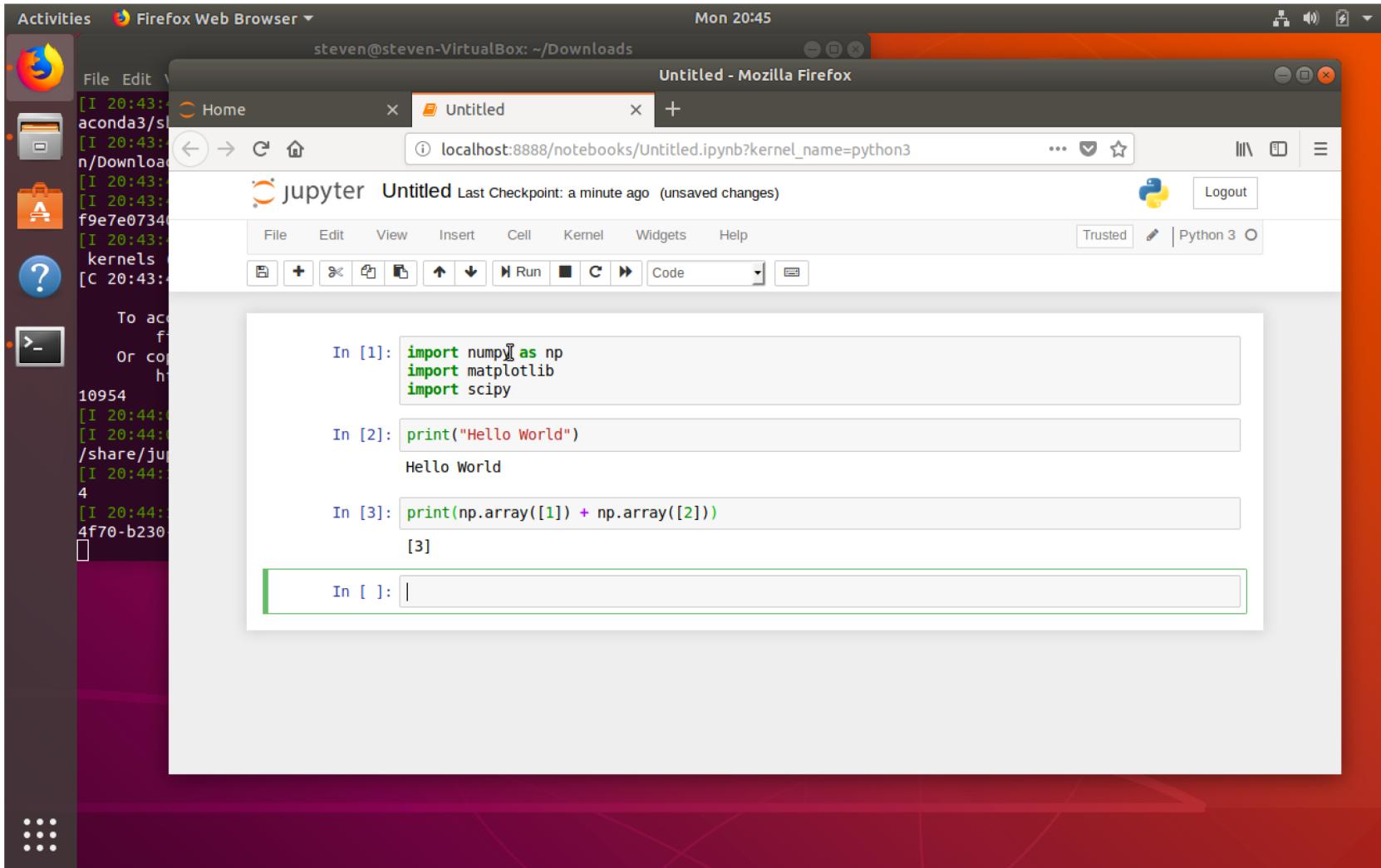
```
steven@steven-VirtualBox:~/Downloads$ which python
/home/steven/anaconda3/bin/python
steven@steven-VirtualBox:~/Downloads$ jupyter notebook
```

The cursor is visible at the end of the command line.

Create a Notebook



Do computer science stuff..



Installing Anaconda Windows 10

Surprisingly easy actually..

Go to the Anaconda Website

The screenshot shows a web browser window displaying the Anaconda download page at <https://www.anaconda.com/download/>. The page has a green header with the Anaconda logo and navigation links for Documentation, Blog, Contact, What is Anaconda?, Products, Support, Resources, About, and Downloads (which is highlighted). Below the header, there are three main sections: "High-Performance Distribution", "Package Management", and "Portal to Data Science". Under "High-Performance Distribution", it says "Easily install 1,400+ [data science packages](#)". Under "Package Management", it says "Manage packages, dependencies and environments with [conda](#)". Under "Portal to Data Science", it says "Uncover insights in your data and create interactive visualizations". Below these sections, there are icons for Windows, macOS, and Linux. The main content area is titled "Anaconda 2018.12 For Windows Installer". It features two download options: "Python 3.7 version *" and "Python 2.7 version *". Each option has a large green "Download" button with a downward arrow. Below each button, there are links for "64-Bit Graphical Installer (614.3 MB)" and "32-Bit Graphical Installer (509.7 MB)". At the bottom of the page, there is a link for "Behind a firewall?", followed by "How to get Python 3.6 or other Python versions" and "How to Install ANACONDA". The browser's address bar shows the URL https://repo.continuum.io/archive/Anaconda3-2018.12-Windows-x86_64.exe. The taskbar at the bottom shows the Start button, a search bar, and icons for File Explorer, Google Chrome, and Mozilla Firefox. The system tray shows battery level, signal strength, and network status.

Click here

High-Performance Distribution

Easily install 1,400+ [data science packages](#)

Package Management

Manage packages, dependencies and environments with [conda](#)

Portal to Data Science

Uncover insights in your data and create interactive visualizations

Windows macOS Linux

Anaconda 2018.12 For Windows Installer

Python 3.7 version *

[Download](#)

64-Bit Graphical Installer (614.3 MB) ②
32-Bit Graphical Installer (509.7 MB)

Python 2.7 version *

[Download](#)

64-Bit Graphical Installer (560.6 MB) ②
32-Bit Graphical Installer (458.6 MB)

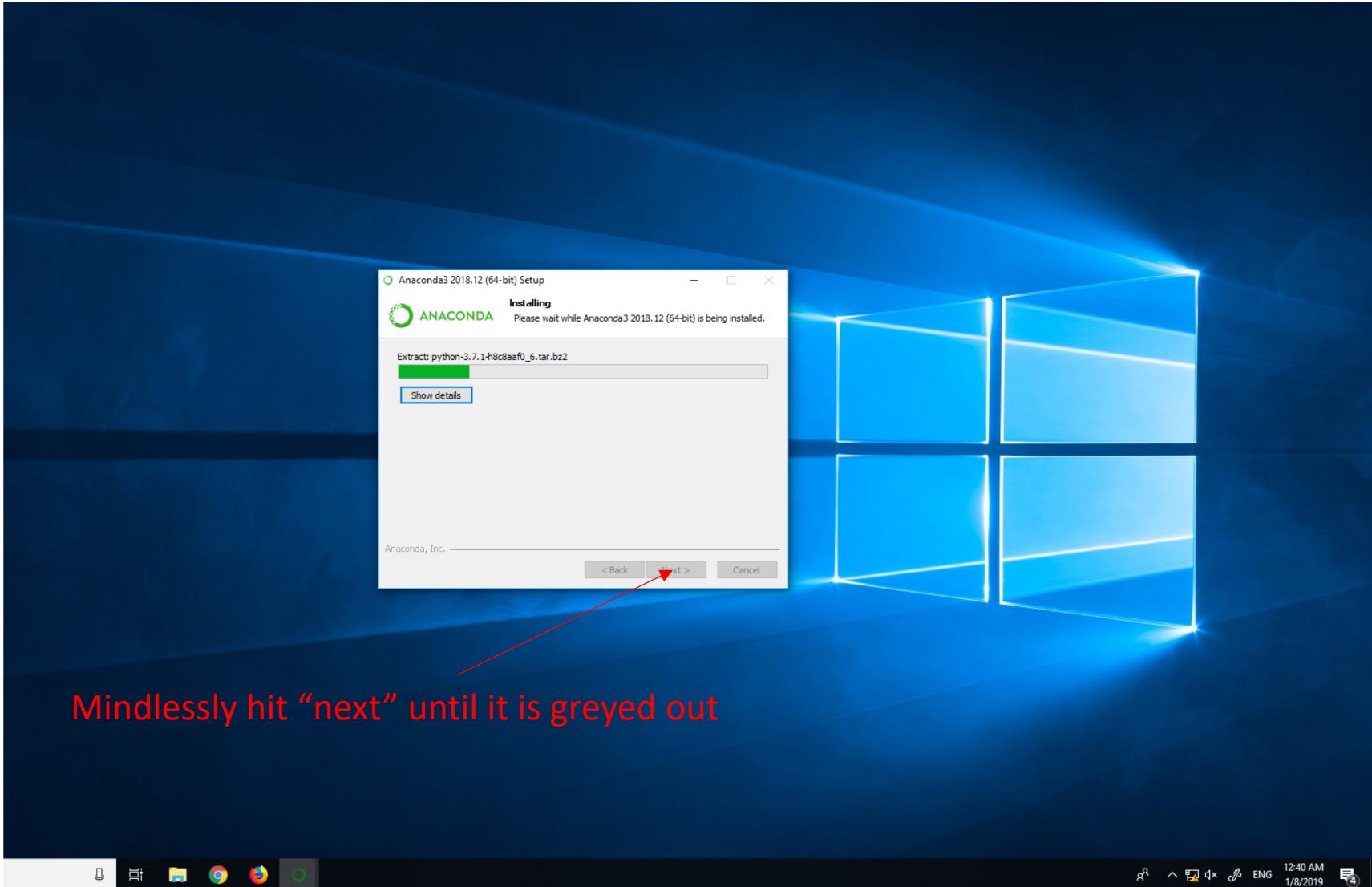
Behind a firewall?
[How to get Python 3.6 or other Python versions](#)
[How to Install ANACONDA](#)

https://repo.continuum.io/archive/Anaconda3-2018.12-Windows-x86_64.exe

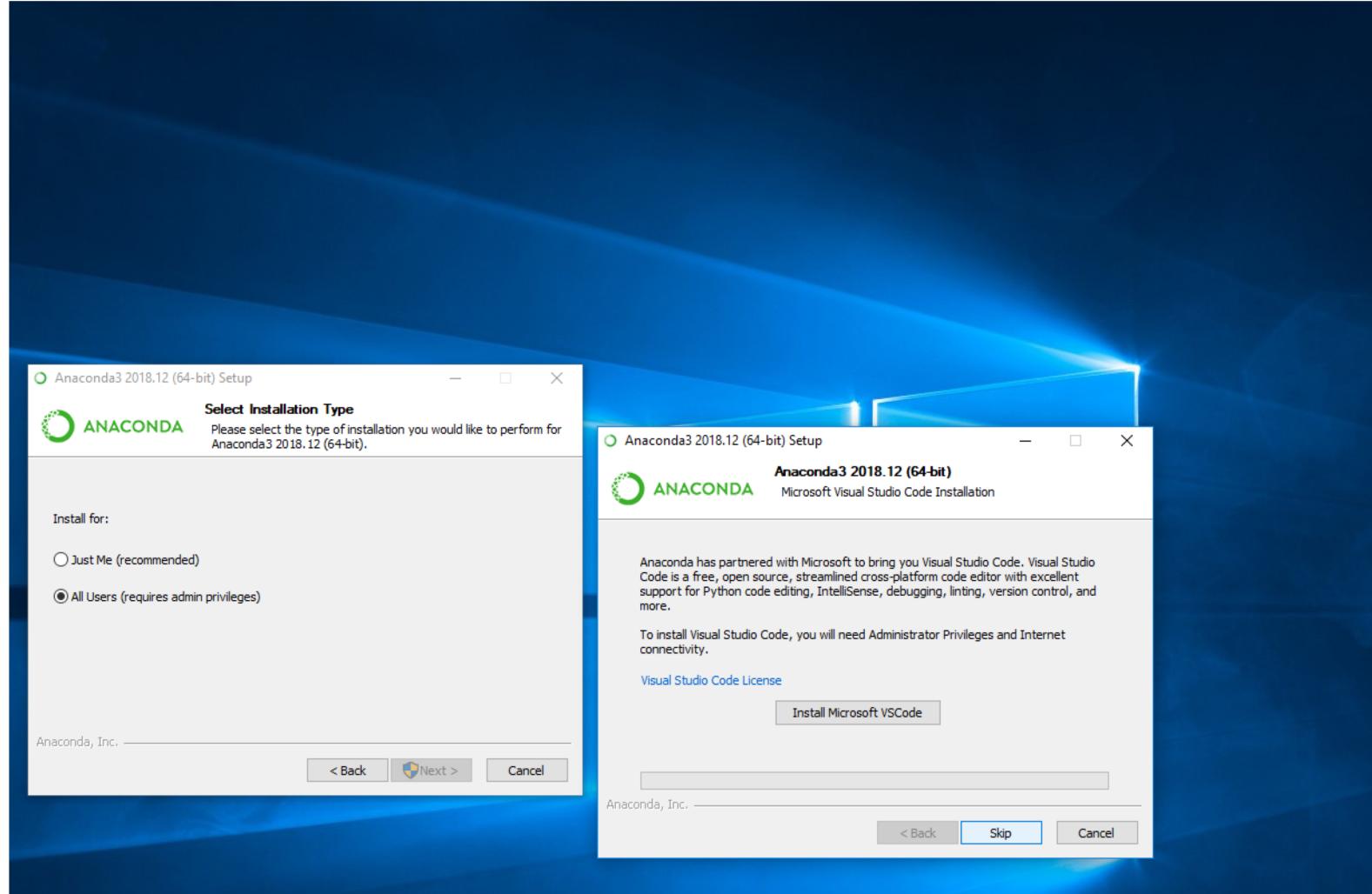
Type here to search

R ENG 12:38 AM 1/8/2019

Open the .exe

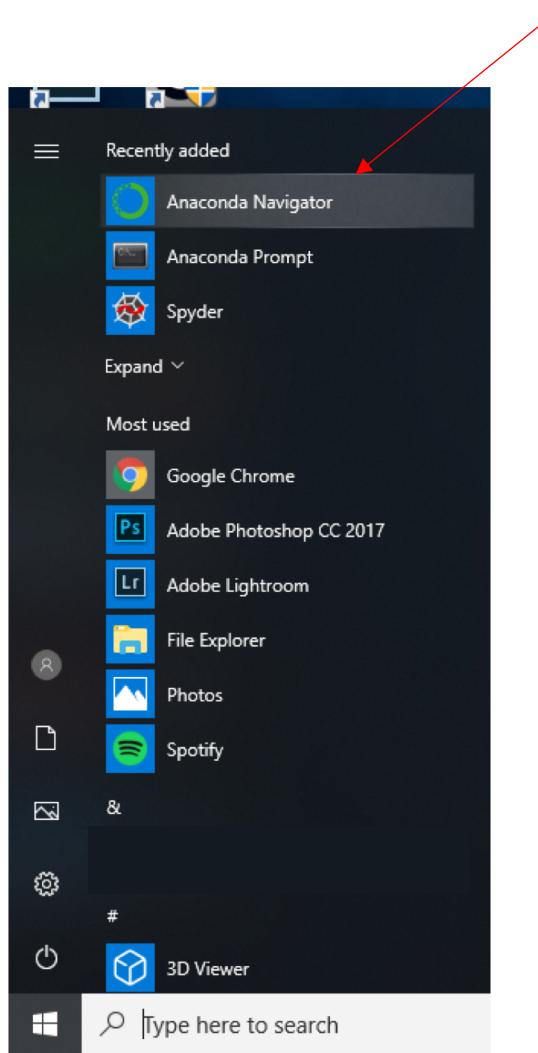


Skip VScode



Find the Anaconda Navigator

Click here



Find Jupyter

Anaconda Navigator

File Help

ANACONDA NAVIGATOR

Sign in to Anaconda Cloud

Home Environments Learning Community Documentation Developer Blog

Applications on base (root) Channels Refresh

JupyterLab 0.35.3 An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture. Launch

Jupyter Notebook 5.7.4 Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis. Launch

Qt Console 4.4.3 PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more. Launch

Spyder 3.3.2 Scientific Python Development Environment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features. Launch

Glueviz 0.13.3 Multidimensional data visualization across files. Explore relationships within and among related datasets. Install

Orange 3 3.17.0 Component based data mining framework. Data visualization and data analysis for novice and expert. Interactive workflows with a large toolbox. Install

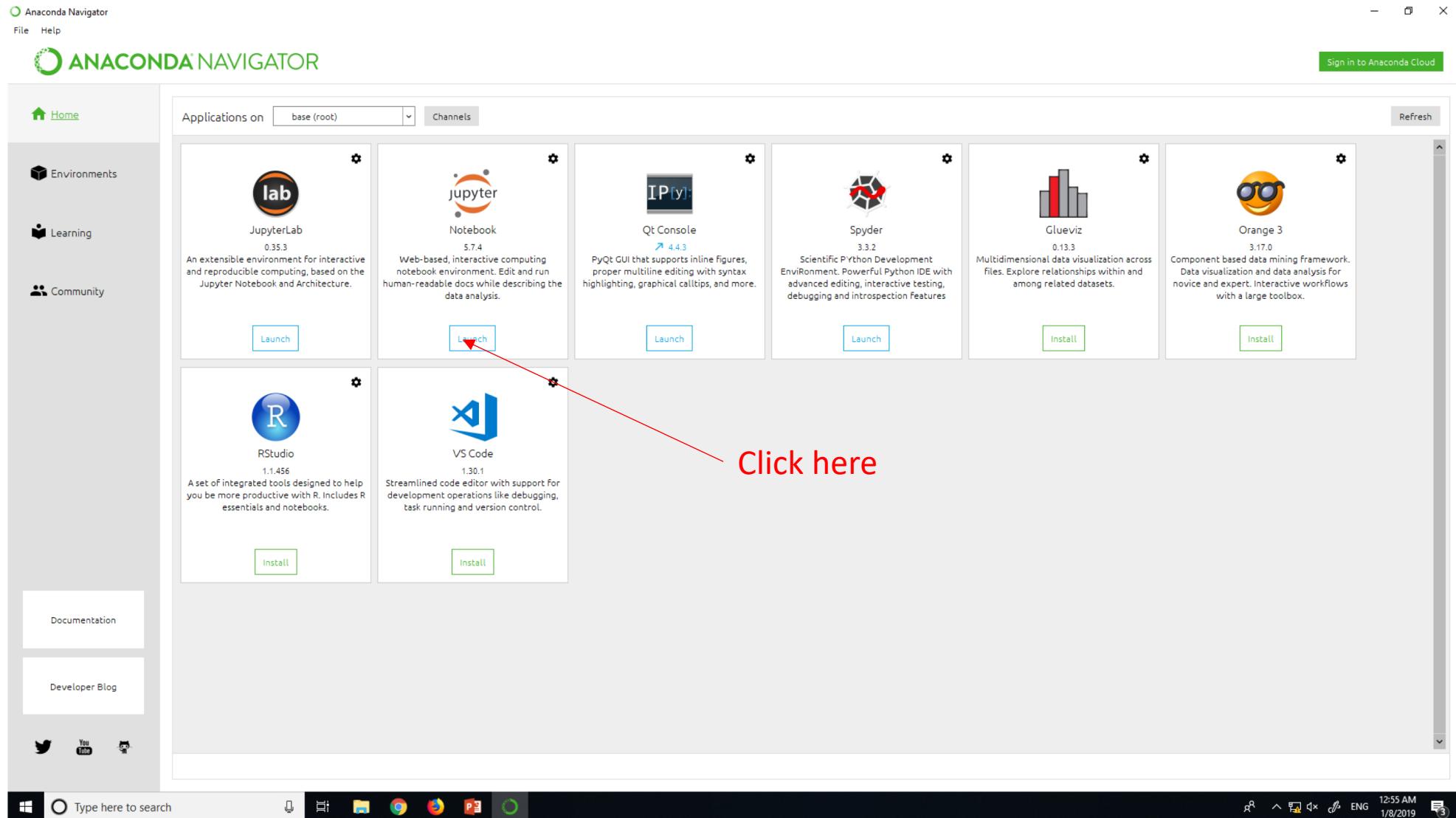
RStudio 1.1.456 A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks. Install

VS Code 1.30.1 Streamlined code editor with support for development operations like debugging, task running and version control. Install

Click here

Type here to search

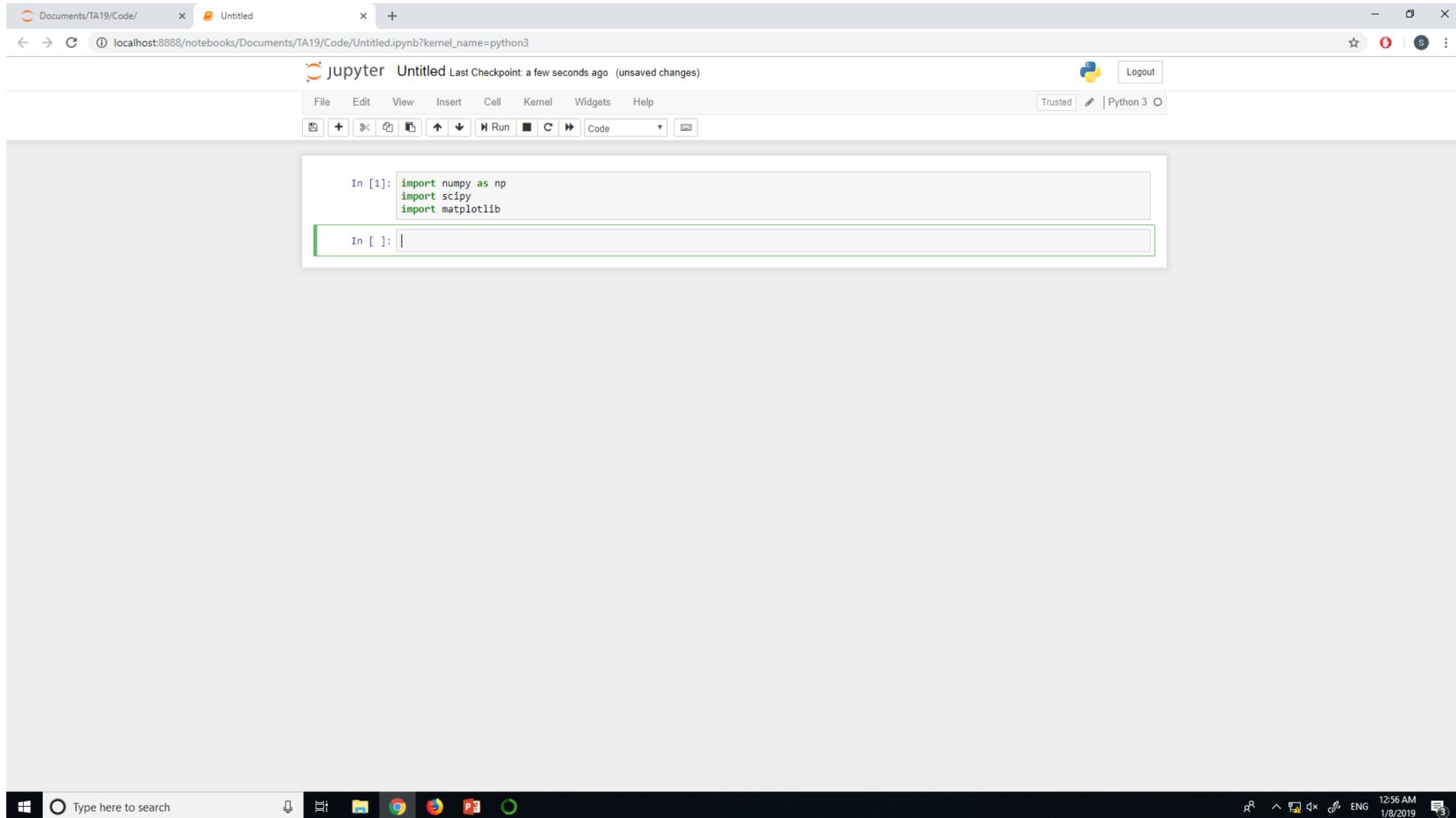
12:55 AM ENG 1/8/2019



Navigate to Your Directory



New > Python3 notebook



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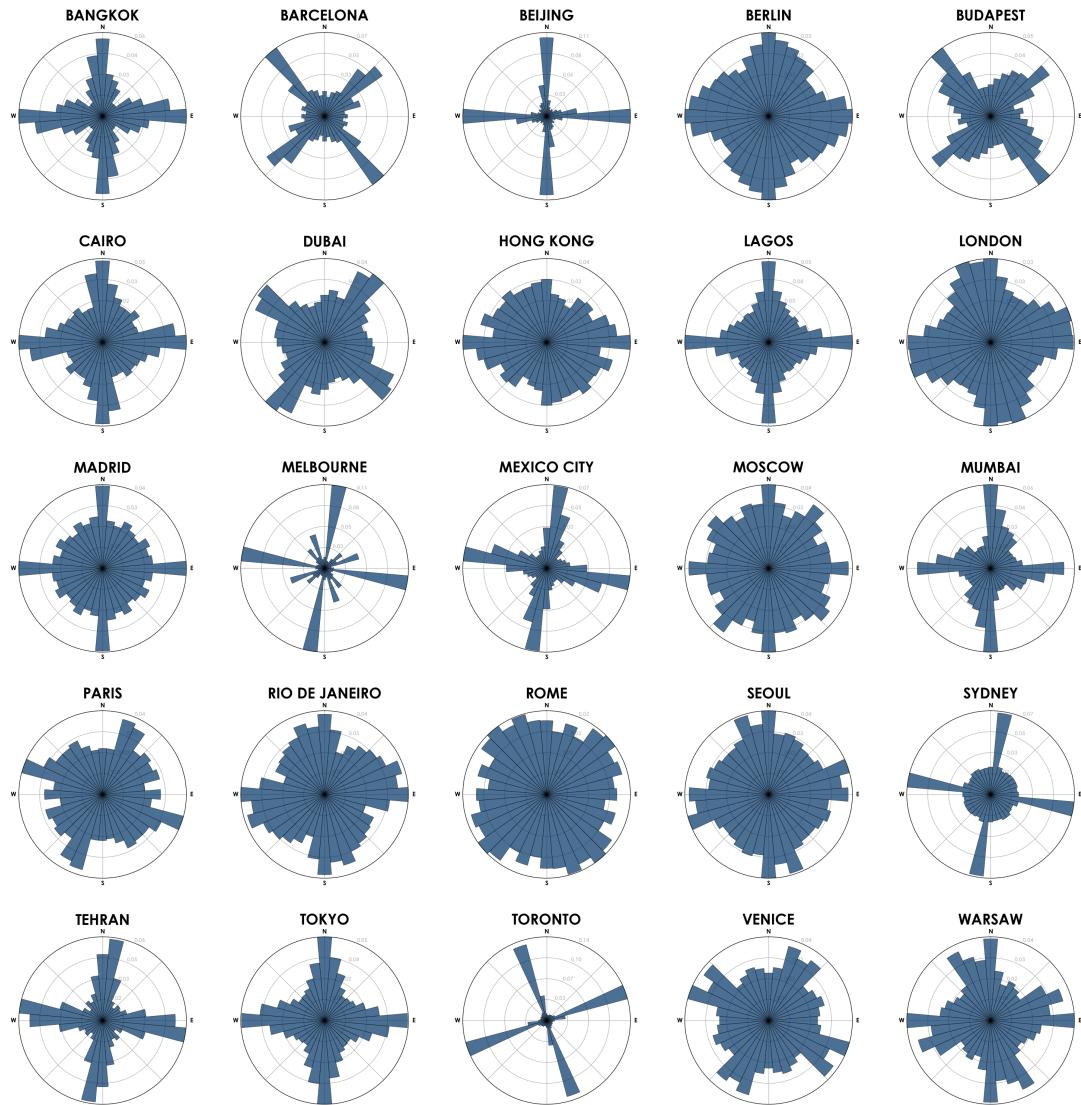
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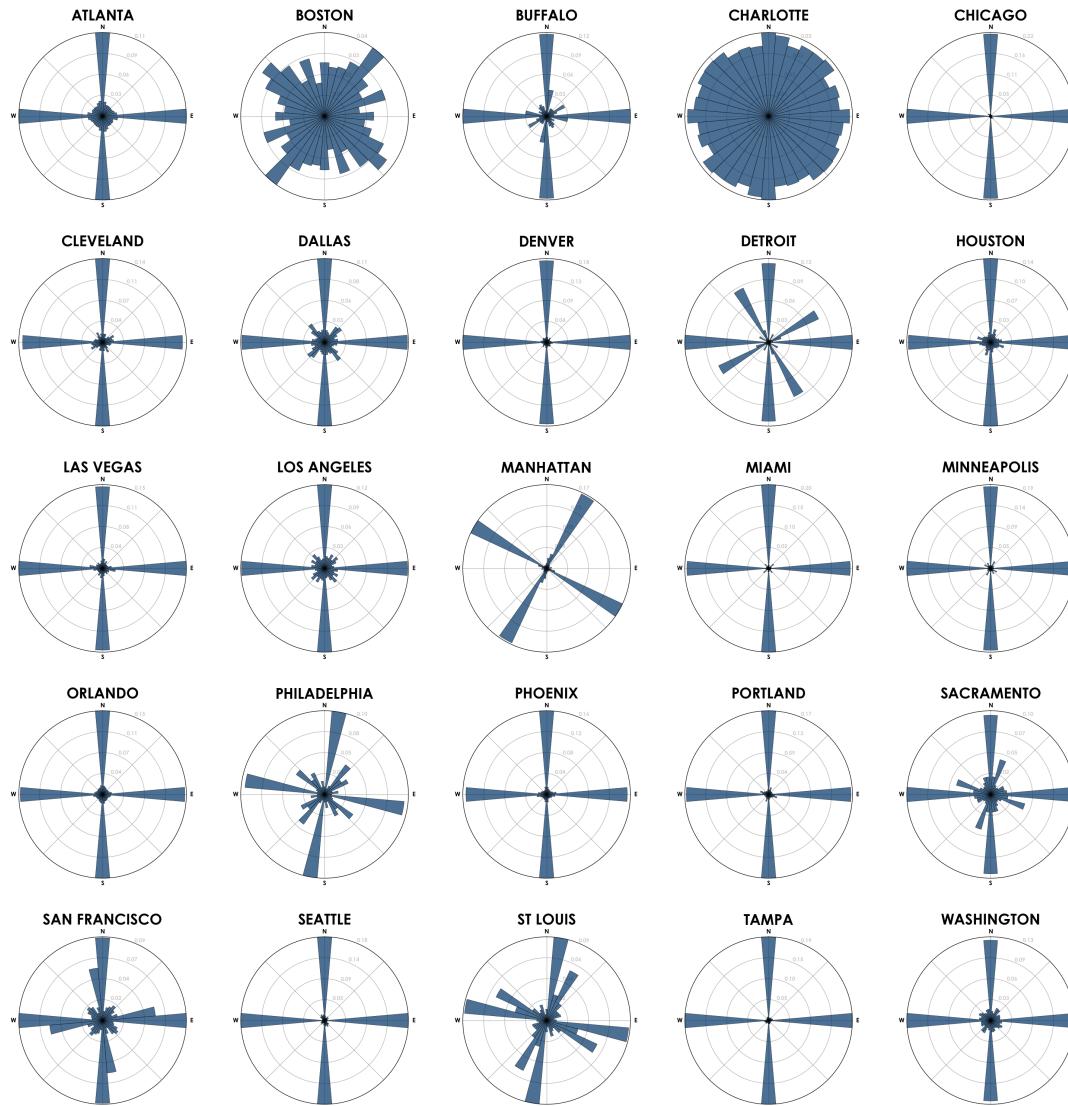
Urban Spatial Order: Street Network Orientation, Configuration, and Entropy

My favorite visualization paper

City Street Network Orientation



City Street Network Orientation



Just a Matplotlib Polar Plot

```
In [6]: def count_and_merge(n, bearings):
    # make twice as many bins as desired, then merge them in pairs
    # prevents bin-edge effects around common values like 0° and 90°
    n = n * 2
    bins = np.arange(n + 1) * 360 / n
    count, _ = np.histogram(bearings, bins=bins)

    # move the last bin to the front, so eg 0.01° and 359.99° will be binned together
    count = np.roll(count, 1)
    return count[::2] + count[1::2]

In [7]: # function to draw a polar histogram for a set of edge bearings
def polar_plot(ax, bearings, n=36, title=''):

    bins = np.arange(n + 1) * 360 / n
    count = count_and_merge(n, bearings)
    _, division = np.histogram(bearings, bins=bins)
    frequency = count / count.sum()
    division = division[0:-1]
    width = 2 * np.pi / n

    ax.set_theta_zero_location('N')
    ax.set_theta_direction('clockwise')

    x = division * np.pi / 180
    bars = ax.bar(x, height=frequency, width=width, align='center', bottom=0, zorder=2,
                  color="#003366", edgecolor='k', linewidth=0.5, alpha=0.7)

    ax.set_ylim(top=frequency.max())

    title_font = {'family':'Century Gothic', 'size':24, 'weight':'bold'}
    xtick_font = {'family':'Century Gothic', 'size':10, 'weight':'bold', 'alpha':1.0, 'zorder':3}
    ytick_font = {'family':'Century Gothic', 'size': 9, 'weight':'bold', 'alpha':0.2, 'zorder':3}

    ax.set_title(title.upper(), y=1.05, fontdict=title_font)

    ax.set_yticks(np.linspace(0, max(ax.get_ylim()), 5))
    yticklabels = ['{:,.2f}'.format(y) for y in ax.get_yticks()]
    yticklabels[0] = ''
    ax.set_yticklabels(labels=yticklabels, fontdict=ytick_font)

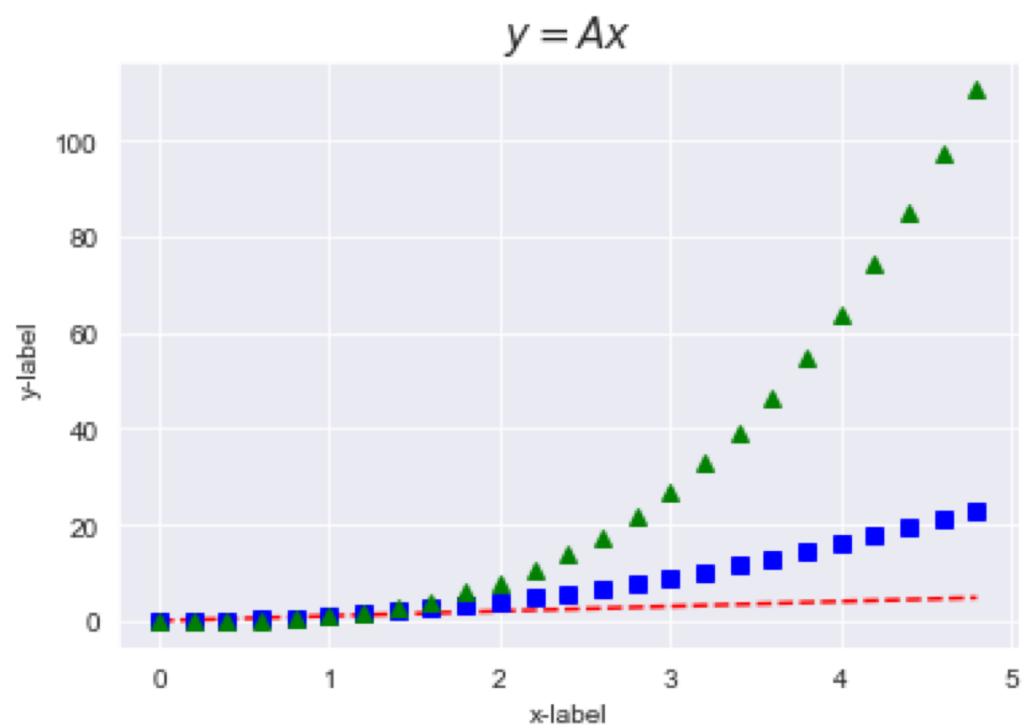
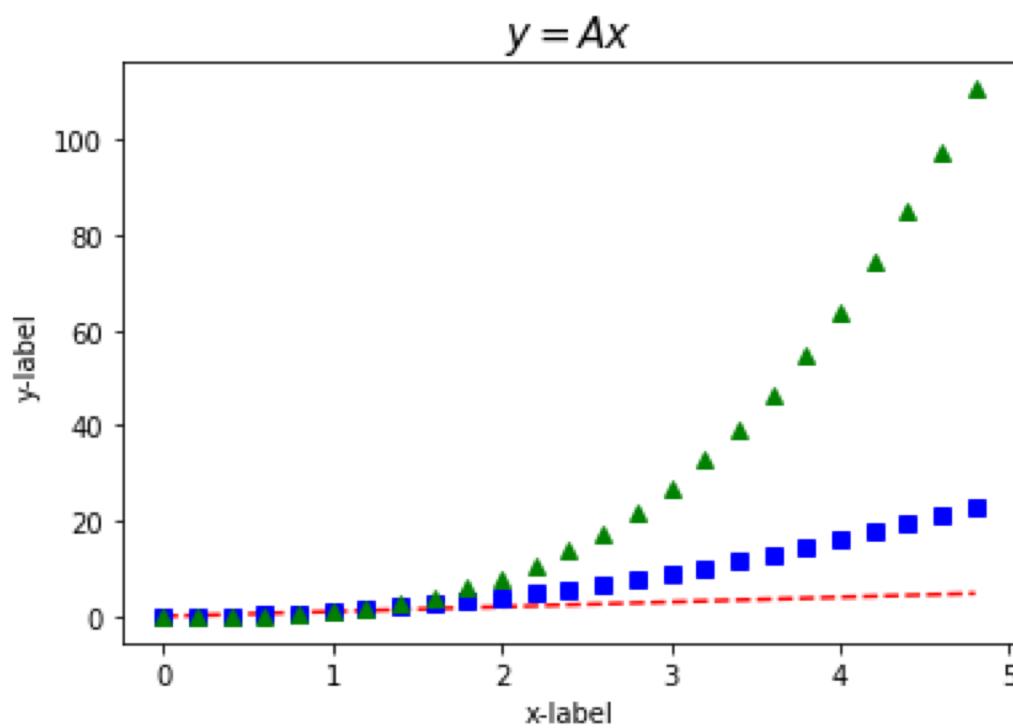
    xticklabels = ['N', '', 'E', '', 'S', '', 'W', '']
    ax.set_xticklabels(labels=xticklabels, fontdict=xtick_font)
    ax.tick_params(axis='x', which='major', pad=-2)
```

1. Store orientation counts in a numpy array
2. Make a polar plot, bar angles = street orientations

Full code available at,

<https://github.com/gboeing/osmnx-examples/blob/master/notebooks/17-street-network-orientations.ipynb>

Matplotlib Styles



Simple Scripts

Matplotlib recipes notebook..

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Gradescope

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Overleaf

Features & Benefits ▾ Templates Plans & Pricing Help ▾ Register Log In

LaTeX, Evolved

The easy to use, online, collaborative LaTeX editor

The screenshot shows the Overleaf LaTeX editor interface. On the left, there's a sidebar with a file tree: 'figures' containing 'universe.jpg', 'sections' containing 'main.tex' (which is selected), and 'references.bib'. The main area has two tabs: 'Source' (selected) and 'Rich Text'. The 'Source' tab displays the LaTeX code for 'main.tex'. The 'Rich Text' tab shows a preview of the document, titled 'The Universe', dated 'September 2018'. It contains an introduction about the universe's fate, a section titled 'Conclusion' with a note about a thought experiment, and a figure caption 'Figure 1: The Universe' with an image of a spiral galaxy.

Source Rich Text

Recompile

The Universe

September 2018

1 Introduction

There is a theory which states that if ever anyone discovers exactly what the Universe is for and why it is here, it will instantly disappear and be replaced by something even more bizarre and inexplicable. There is another theory which states that this has already happened.

2 Conclusion

There is a theory which states that if ever anyone discovers exactly what the Universe is for and why it is here, it will instantly disappear and be replaced by something even more bizarre and inexplicable. There is another theory which states that this has already happened.

Figure 1: The Universe

Get started now

email@example.com

Register

LyX

The screenshot shows the official website for LyX, "The Document Processor". The page features a dark header with the LyX logo and a navigation bar with links for Home, Download, News, Learn More (Features, Screenshots, About LyX), Support (Mailing Lists / Forum, Wiki / Documentation), Contribute (Get Involved, Development, Bug Tracker, Translation, Donate), and Development Status (Road map / News, Repository Checkins). A language selection dropdown at the top right includes English, Japanese, Hungarian, Spanish, French, German, and Russian. A "Login" link is also present. The main content area displays a screenshot of the LyX application interface showing a document titled "Abstract" with some text and mathematical notation. To the right of the screenshot is a green "download" button featuring a cartoon owl icon. Below the screenshot, two paragraphs explain what LyX is and how it differs from WYSIWYG processors. Another paragraph highlights its strengths in handling mathematical content and structured documents. At the bottom, a final paragraph states that LyX is released under a free software license and available in multiple languages.

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LyX – The Document Processor

This is a preliminary report on surface photometry of the major fraction of known globular clusters, to see which of them show the signs of a collapsed core. We also explore some dimensional mathematics and

LyX is a document processor that encourages an approach to writing based on the *structure* of your documents ([WYSIWYM](#)) and not simply their appearance ([WYSIWYG](#)).

LyX combines the power and flexibility of [TeX/LaTeX](#) with the ease of use of a graphical interface. This results in world-class support for creation of mathematical content (via a fully integrated equation editor) and structured documents like academic articles, theses, and books. In addition, staples of scientific authoring such as reference list and index creation come standard. But you can also use LyX to create a letter or a novel or a theatre play or film script. A broad array of ready, well-designed document layouts are built in.

LyX is for people who want their writing to look great, right out of the box. No more endless tinkering with formatting details, “finger painting” font attributes or futzing around with page boundaries. You just write. On screen, LyX looks like any word processor; its printed output — or richly cross-referenced PDF, just as readily produced — looks like nothing else.

LyX is released under a [Free Software/Open Source license](#), runs on Linux/Unix, Windows, and Mac OS X, and is available in [several languages](#).

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