
Vehicle Components & Vehicle Dynamics

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HAGENBERG | LINZ | STEYR | WELS



UNIVERSITY
OF APPLIED SCIENCES
UPPER AUSTRIA

Coding Assignment

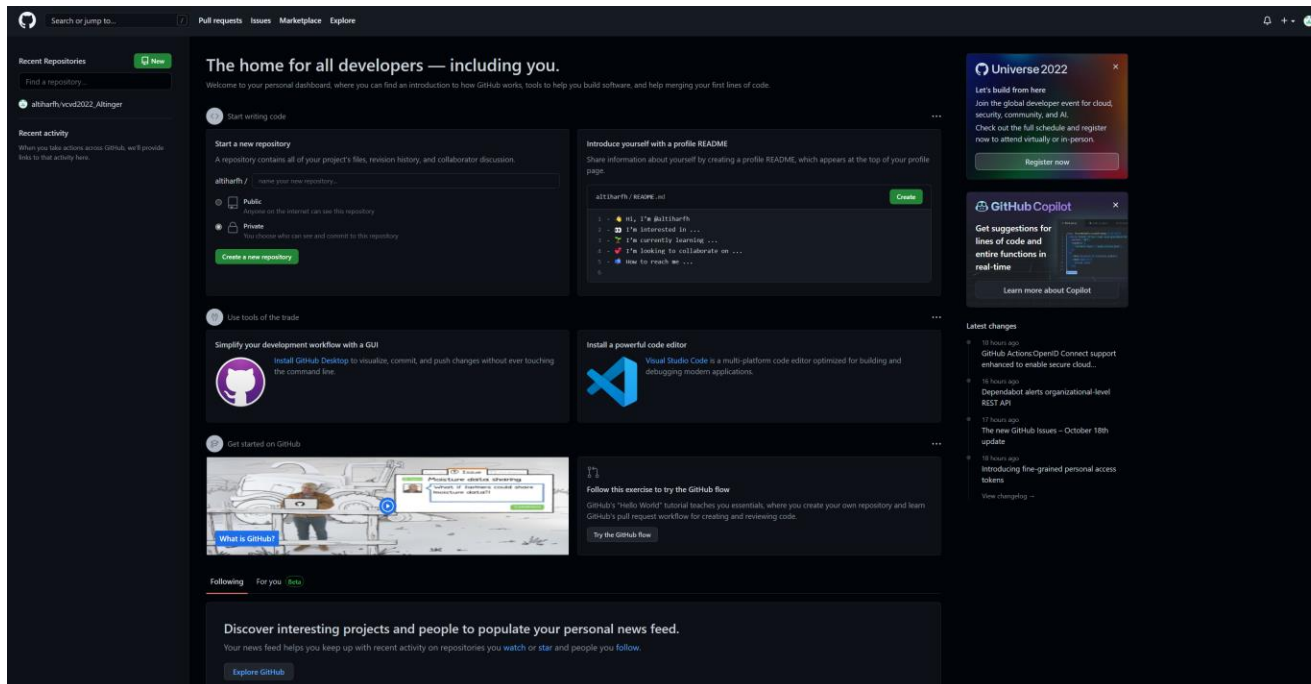


python

GIT

<https://github.com/>

- Create a github Account




GIT

Create Repro

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? [Import a repository.](#)

Owner *  altiharfh

Repository name * vcvd2022_Altinger ✓

Great repository names are short and memorable. Need inspiration? How about [reimagined-funicular?](#)

Description (optional)

vehicle components and vehicle dynamics WS2022/2023

☒ Public
Anyone on the internet can see this repository. You choose who can commit.

☐ Private
You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.

☒ Add a README file
This is where you can write a long description for your project. [Learn more.](#)

Add .gitignore

Choose which files not to track from a list of templates. [Learn more.](#)

.gitignore template: None

Choose a license

A license tells others what they can and can't do with your code. [Learn more.](#)

License: GNU General Public ...

This will set `main` as the default branch. Change the default name in your [settings](#).

ⓘ You are creating a public repository in your personal account.

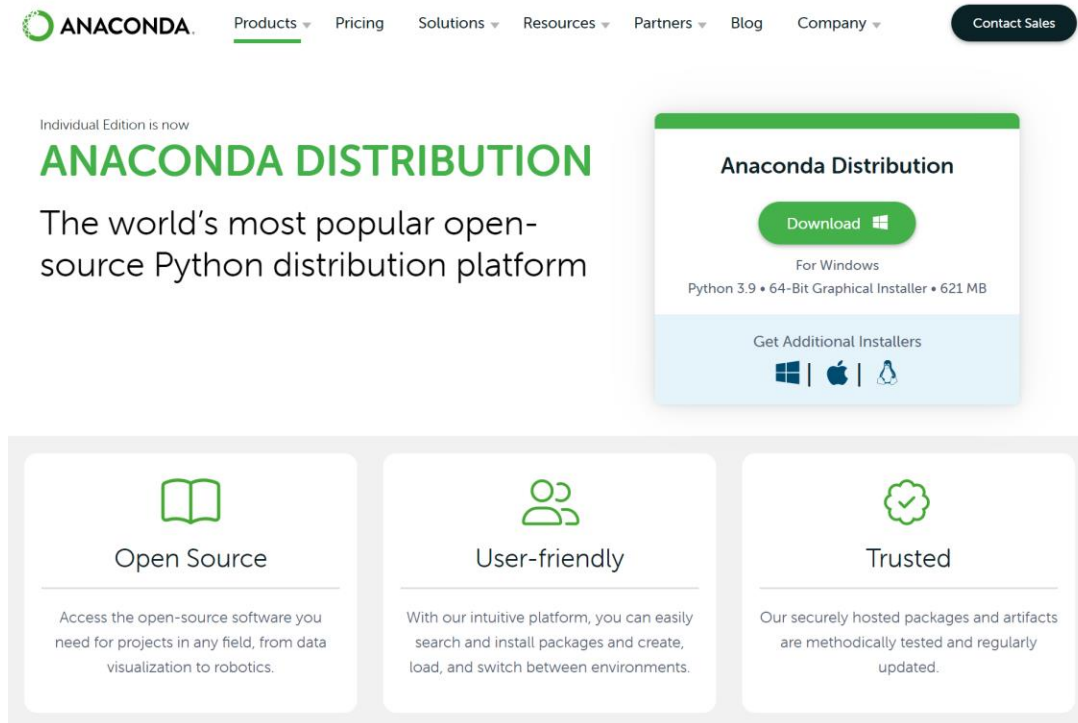
Create repository



https://github.com/altiharfh/vcvd2022_Altinger.git

Python Packages

Anaconda



The screenshot shows the Anaconda Distribution website. At the top, there is a navigation bar with links for Products, Pricing, Solutions, Resources, Partners, Blog, and Company, along with a Contact Sales button. Below the navigation bar, the text "Individual Edition is now" is followed by "ANACONDA DISTRIBUTION" in green. The main heading is "The world's most popular open-source Python distribution platform". Below this, there is a "Download" button for Windows, with details: "For Windows", "Python 3.9 • 64-Bit Graphical Installer • 621 MB". Below the download button, there is a link to "Get Additional Installers" with icons for Windows, Apple, and Linux. At the bottom, there are three columns: "Open Source" (with an open book icon), "User-friendly" (with a person icon), and "Trusted" (with a checkmark icon). Each column has a brief description of the feature.

- Python package manager
- Define python packages you need
- Transfer project settings between computers

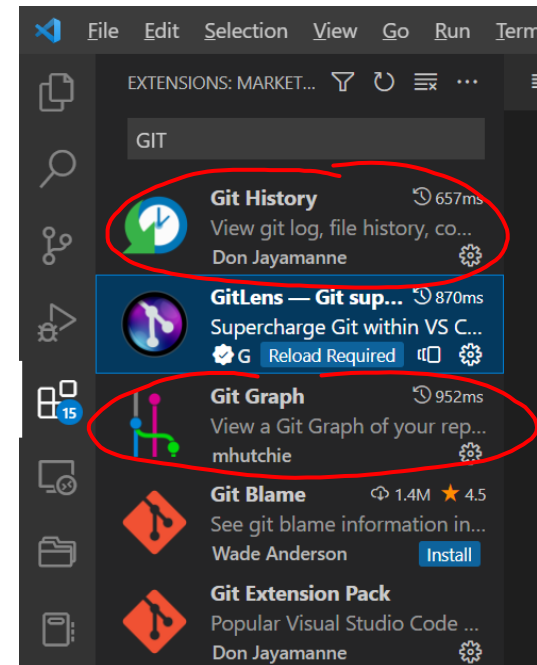
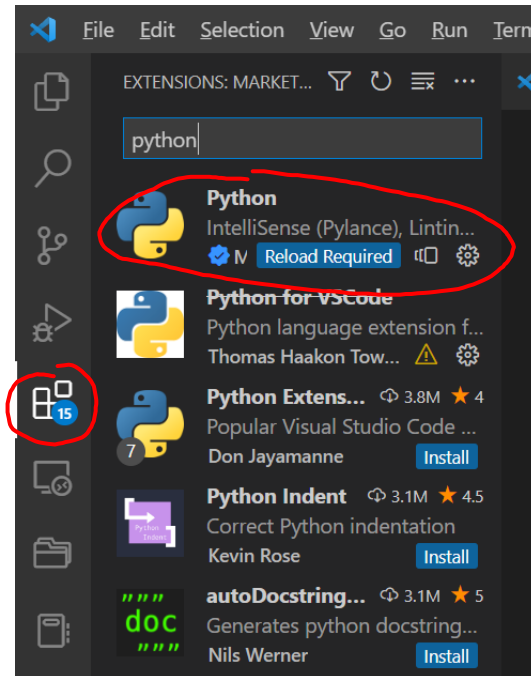


SCAN ME

Python Editor

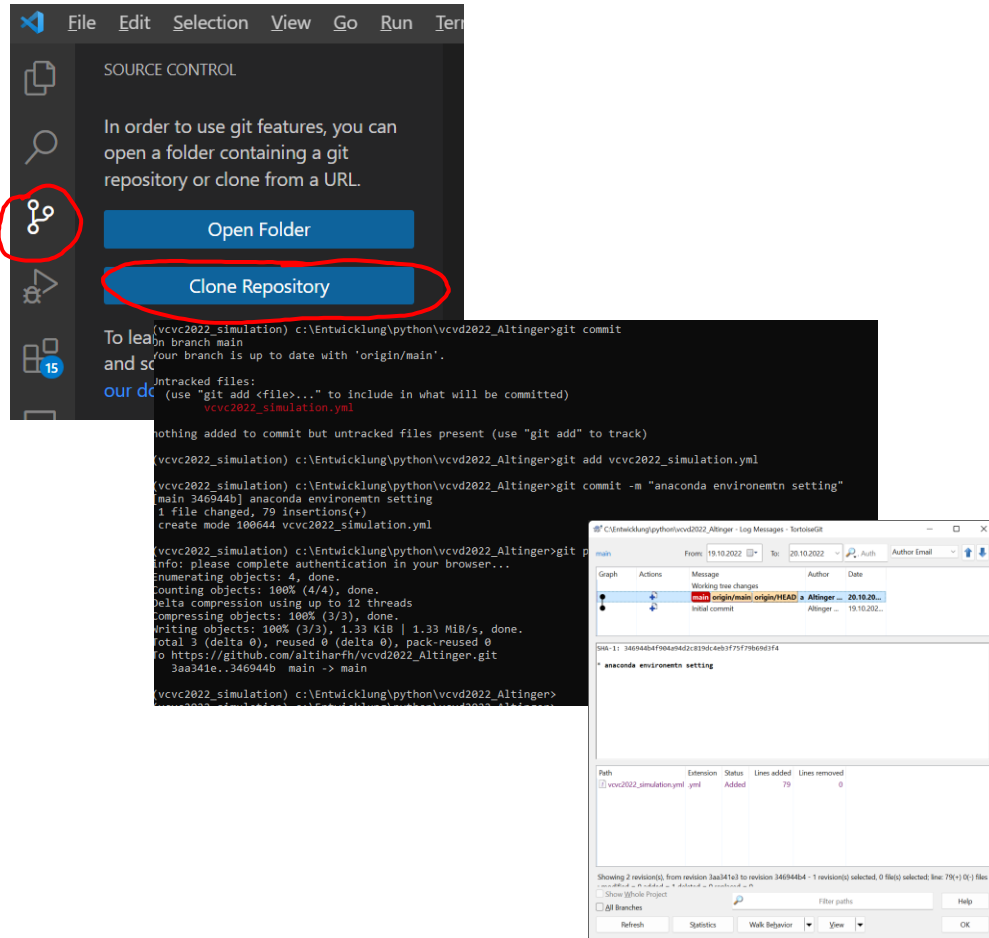
e.g. Visual Studio with python extension

- Extensions
 - Python
 - GIT



Clone Repro

Git workflow



- **Git clone**
<https://github.com/altiharfh/vcvd2022> Altinger.git
- **Git add [filename]**
- **Git commit -m [comment to commit]**
- **Git Push**
- **Git Pull**



Clone Repro

Git workflow

```
(vcvc2022_simulation) c:\Entwicklung\python\vcvd2022_Altinger>git commit
On branch main
Your branch is up to date with 'origin/main'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
      vcvc2022_simulation.yml

nothing added to commit but untracked files present (use "git add" to track)

(vcvc2022_simulation) c:\Entwicklung\python\vcvd2022_Altinger>git add vcvc2022_simulation.yml

(vcvc2022_simulation) c:\Entwicklung\python\vcvd2022_Altinger>git commit -m "anaconda environemtn setting"
[main 346944b] anaconda environemtn setting
1 file changed, 79 insertions(+)
create mode 100644 vcvc2022_simulation.yml

(vcvc2022_simulation) c:\Entwicklung\python\vcvd2022_Altinger>git push
info: please complete authentication in your browser...
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 12 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 1.33 KiB | 1.33 MiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/altiharfh/vcvd2022_Altinger.git
   3aa341e..346944b  main -> main

(vcvc2022_simulation) c:\Entwicklung\python\vcvd2022_Altinger>
```

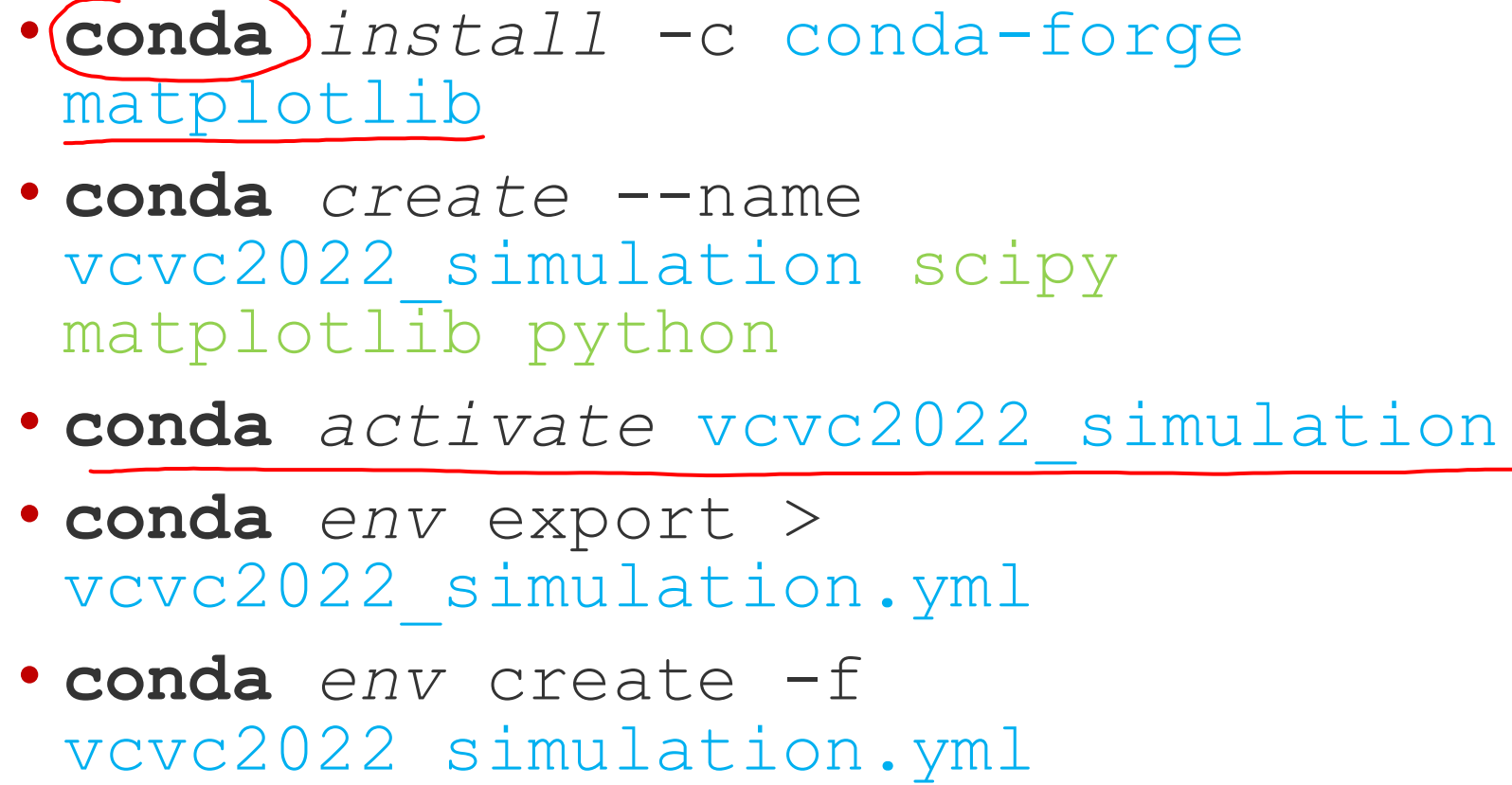


[com/altih
ltinger.g](https://github.com/altiharfh/vcvd2022_Altinger.git)

me]

comment

Create working environment



```

.:\\Entwicklung\\python\\vcvd2022_Altinger>conda create --name vcvc2022_simulation scipy matplotlib
Collecting package metadata (current_repodata.json): done
Solving environment: done

## Package Plan ##

  environment location: c:\\proglang\\runtime\\anaconda\\envs\\vcvc2022_simulation

added / updated specs:
- matplotlib
- python
- scipy

The following packages will be downloaded:

package                                     build                                     1.6 MB
-----
glib-2.69.1                                h5dc1a3c_1                                1.6 MB
gst-plugins-base-1.18.5                   h9e645db_0                                1.7 MB
gstreamer-1.18.5                           hd78058f_0                                1.7 MB
kiwisolver-1.4.2                           py310hd77b12b_0                            58 KB
libclang-12.0.0                           default_h627e005_2                        17.8 MB
libogg-1.3.5                               h2bbff1b_1                                33 KB
libvorbis-1.3.7                           he774522_0                                202 KB
libwebp-1.2.4                              h2bbff1b_0                                67 KB
libwebp-base-1.2.4                        h2bbff1b_0                                279 KB
matplotlib-base-3.5.2                     py310hd77b12b_0                            5.6 MB
mkl-service-2.4.0                         py310h2bbff1b_0                             48 KB
mkl_fft-1.3.1                             py310ha0764ea_0                           136 KB
mkl_random-1.2.2                          py310h4ed8f06_0                           221 KB
numpy-1.23.3                              py310h60c9a35_0                             11 KB
numpy-base-1.23.3                         py310h04254f7_0                           5.0 MB
pcre-8.45                                 hd77b12b_0                                382 KB
ply-3.11                                  py310haa95532_0                             81 KB
pyparsing-3.0.9                           py310haa95532_0                            154 KB
pyqt-5.15.7                               py310hd77b12b_0                            3.7 MB
pyqt5-sip-12.11.0                         py310hd77b12b_0                             75 KB
qt-main-5.15.2                             he8e5bd7_7                               50.0 MB
qt-webengine-5.15.9                       hb9a9bb5_4                               48.9 MB
qtwebkit-5.212                            h3ad3cdb_4                               10.3 MB
scipy-1.9.1                               py310h86744a3_0                           15.7 MB
sip-6.6.2                                 py310hd77b12b_0                             437 KB
tornado-6.2                               py310h2bbff1b_0                             619 KB
-----
Total:                                     164.7 MB

Proceed ([y]/n)? y

Downloading and Extracting Packages
glib-2.69.1 | 1.6 MB | #####
mkl-service-2.4.0 | 48 KB | #####
pyqt-5.15.7 | 3.7 MB | #####
mkl_fft-1.3.1 | 136 KB | #####
pyqt5-sip-12.11.0 | 75 KB | #####
qt-webengine-5.15.9 | 48.9 MB | #####
libwebp-base-1.2.4 | 279 KB | #####
scipy-1.9.1 | 15.7 MB | #####
gstreamer-1.18.5 | 1.7 MB | #####
tornado-6.2 | 619 KB | #####
matplotlib-base-3.5.2 | 5.6 MB | #####
libclang-12.0.0 | 17.8 MB | #####
qtwebkit-5.212 | 10.3 MB | #####
qt-main-5.15.2 | 50.0 MB | #####
ply-3.11 | 81 KB | #####
libwebp-1.2.4 | 67 KB | #####
libogg-1.3.5 | 33 KB | #####
pcre-8.45 | 382 KB | #####
libvorbis-1.3.7 | 202 KB | #####
kiwisolver-1.4.2 | 58 KB | #####
numpy-base-1.23.3 | 5.0 MB | #####
sip-6.6.2 | 437 KB | #####
numpy-1.23.3 | 11 KB | #####
gst-plugins-base-1.1 | 1.7 MB | #####
mkl_random-1.2.2 | 221 KB | #####
pyparsing-3.0.9 | 154 KB | #####
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
#     $ conda activate vcvc2022_simulation
#
# To deactivate an active environment, use
#
#     $ conda deactivate

Retrieving notices: ...working... done
```

Rules

When coding

→ Check GPP

- Write the code on your own
- Do not copy & paste from others (incl. internet)
- Cite code properly:

```
#-----  
#copy code  
#source:  
[code here]  
#end copy  
#-----
```

```
1 #-----  
2 #copy code  
3 #source: https://matplotlib.org/stable/plot\_types/basic/plot.html#sphx-glr-plot-types-basic-plot-py  
4 import matplotlib.pyplot as plt  
5 import numpy as np  
6  
7 plt.style.use('_mpl-gallery')  
8  
9 # make data  
10 x = np.linspace(0, 10, 100)  
11 y = 4 + 2 * np.sin(2 * x)  
12  
13 # plot  
14 fig, ax = plt.subplots()  
15  
16 ax.plot(x, y, linewidth=2.0)  
17  
18 ax.set(xlim=(0, 8), xticks=np.arange(1, 8),  
19       ylim=(0, 8), yticks=np.arange(1, 8))  
20  
21 plt.show()  
22 #end copy  
23 #-----
```

Rules

Coding guideline



- Follow google code guidelines, see link
Pylint cfg file, see link

```
pylint --rcfile  
./code_guideline/googlePyLintSettings  
.cfg main.py
```
- No spaces on file & folder names
- No variable names with single letters, e.g. v, t, ...
- On Class per file

- short methode names
- Short methods (< 72 LOC)
- No global variables
- No hardcoded values

Rules

Coding guideline



- Use argparse

```
import argparse
arg_parser =
argparse.ArgumentParser(description="Process
some integers.")
arg_parser.add_argument("summand_a",
type=int, help="an integer for the
accumulator")
cmd_call_args_ = arg_parser.parse_args()
print (cmd_call_args_.summand_a)
```

- Use comments on source

```
#import argument parser
import argparse
#setup arg parser
arg_parser =
argparse.ArgumentParser(description=
"Process some integers.")
```

- Comment Methods

- Set default values for params

```
#####
# this is a method
# param in: param_x ... value x
#####
def myMethod(param_x = 0, param_y = 0):
.
.
Return my_return_val
```

Rules

Documentation

- Add a Read.me to the repository
 - Your name
 - Your Student id
 - Sample call statements

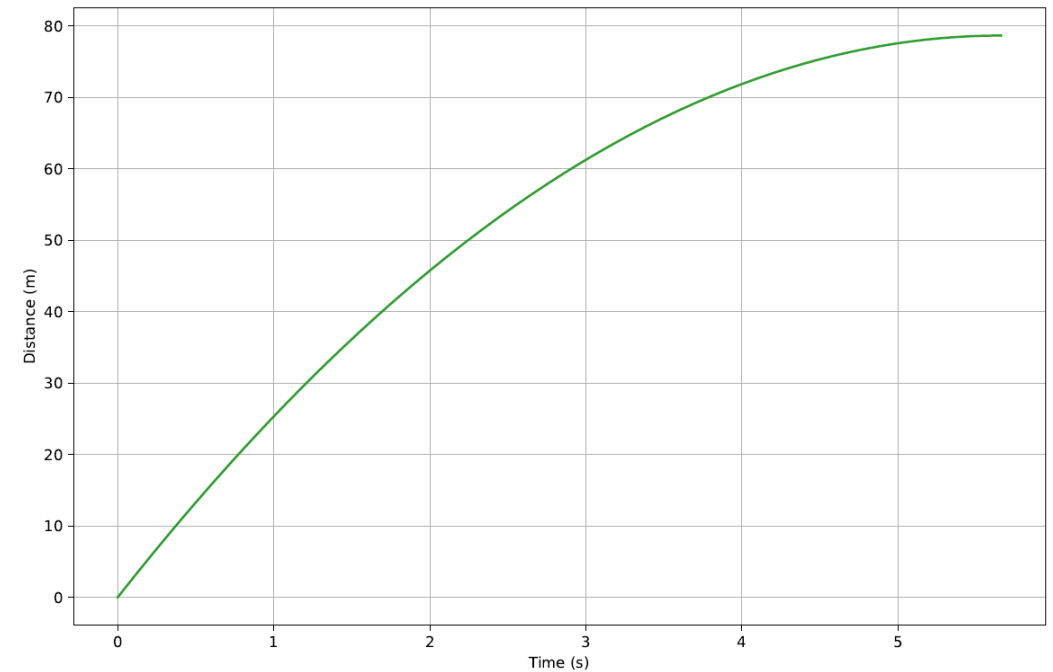
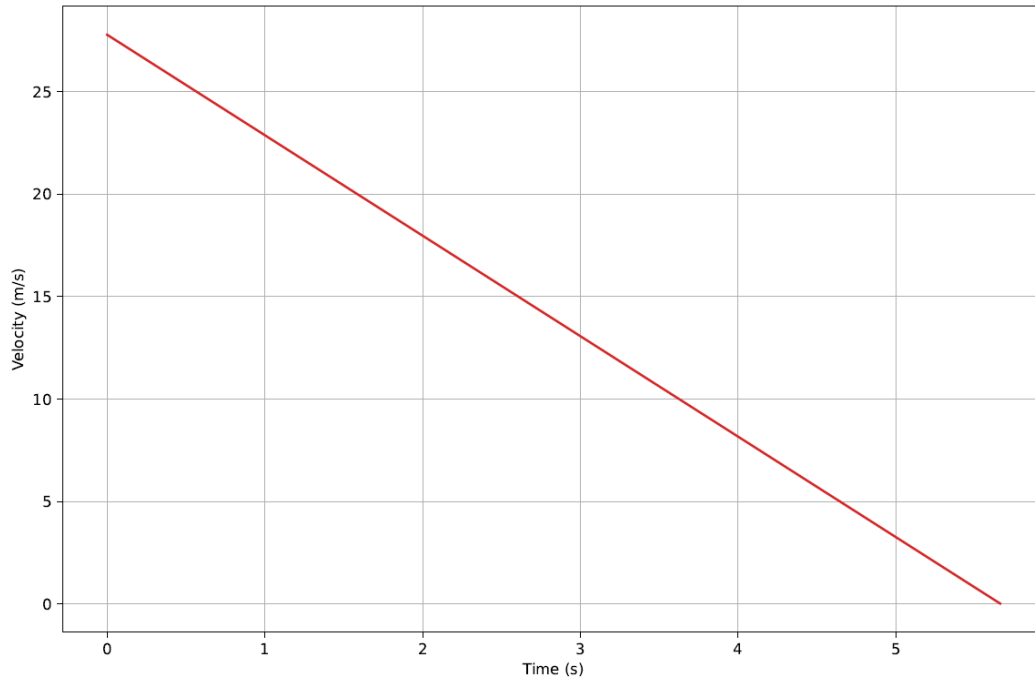
```
Python p27761.py --mass=1000,  
--velocity=55, --friction=0.65
```

Guideline

- Name the file with your student id, e.g.:
p27761.py
- Call args:
 - --mass
 - --velocity
 - --friction
- Plot Diagrams
 - Velocity \ time
 - Distance \ time

Plots

Min. Required Plots



Deacceleration

tabular values

- Passenger car friction coefficient

wheel ▾	road ▾	condition ▾	μ Static ▾	μ Dynamic ▾
rubber	concrete	dry	0,65	0,5
rubber	concrete	wet	0,4	0,35
rubber	ice	dry	0,2	0,15
rubber	ice	wet	0,1	0,08
rubber	water	aquaplaning	0,1	0,05
rubber	gravel	dry		0,35
rubber	sand	dry		0,3

Source: [3]

Formulas

Might be required

physics

$$F_R = \mu * F_N$$

$$F_R = \mu * m * g$$

$$v = a * t$$

$$s = s_0 + v * t + \frac{1}{2} * a * t^2$$

*conservation of
Energy*

$$W_{kin} = \frac{m * v^2}{2}$$

$$W_{friction} = \int_0^s F_r * dx$$

rule of thumb

$$\left(\frac{v}{10}\right)^2 = s_{normal}$$

$$\left(\frac{v}{10}\right)^2 * \frac{1}{2} = s_{danger}$$






$$\left(\frac{v}{10}\right) * 3 = s_{reaction}$$

$$s_{normal} + s_{reaction} = s_{stop}$$

$$s_{danger} + s_{reaction} = s_{stop_danger}$$

Programming

Todos

- Simulate breaking distance
 - Derive formular ✓
 - variance parameters ✓
 - Mass 
 - Velocity 
 - Road type 
 - Wet & dry
 - inclination 
 - Compare simply physics model to driving lecture rule of thumb 
- Time based simulation
- Create & export plots
- Upload code to repository
- Set repository to public
AFTER deadline and send me the link via email

Hints

Some tips

- `scipy.constants` --> [Link](#)