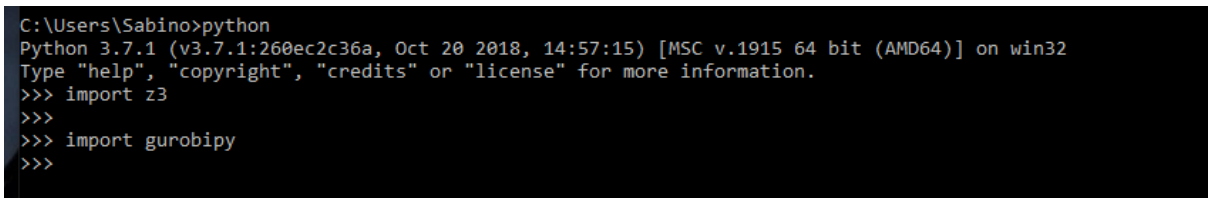
HOW TO SET UP PYCHARM, GUROBI AND Z3 ON YOUR MACHINE

In this course, you'll have to complete three assignments and in order to do so you will utilize two solvers, state of the art in their respective fields: the MILP solver Gurobi and the SMT solver Z3. We also recommend that you write your code using an IDE (integrated development environment). You are not constrained in the choice of the editor (you could even choose to use none and run your scripts directly from the command window); nonetheless we suggest to use PyCharm, since we can provide assistance in case of necessity.

We recommend installing Gurobi 8.1.1 and either Python 3.6 or 3.7 in order to avoid incompatibility issues. A way to check that the solvers are correctly installed is to open the command window, launch python, and then import the solvers using the commands **import z3** and **import gurobipy**. If no error is reported, the installation has been successful.



Linux (ubuntu)

- Gurobi: https://www.gurobi.com/

Once you are on the Gurobi homepage, you have to sign up and create an account as a student. Chalmers allows you to have a free academic license.

Before you can install the license on your computer you need to have Gurobi installed on your computer. Download the latest version and then add the directory to the bashrc; detailed instructions to do so are on this webpage:

https://www.gurobi.com/documentation/9.1/remoteservices/linux_installation.html

in order to be able to run Gurobi API with your own python environment, follow these instructions:

https://www.gurobi.com/documentation/8.1/quickstart_linux/py_building_and_running_th.html#subsection:pythonrun

- Z3 https://github.com/Z3Prover/z3

The easiest way to get z3 on your computer is to install it via pip running the command

pip install z3-solver

Should this not work, the following page offers a clear step-by-step explanation about how to install z3:

http://www.cs.utexas.edu/users/moore/acl2/manuals/current/manual/index-seo.php/SMT____Z3-INSTALLATION

you will have to build z3 using make command, this might take some 20 minutes or more, depending on your machine so, take your time to do it.

if you are having troubles adding the folder to the environmental variables, try:

1. sudo -H gedit /etc/environment
2. once in the file, PYTHONPATH='the_path'
3. nano ~/.bashrc
4. write at the end of the file: export PYTHONPATH=$HOME/usr/lib/python-2.7/site-packages:$PYTHONPATH

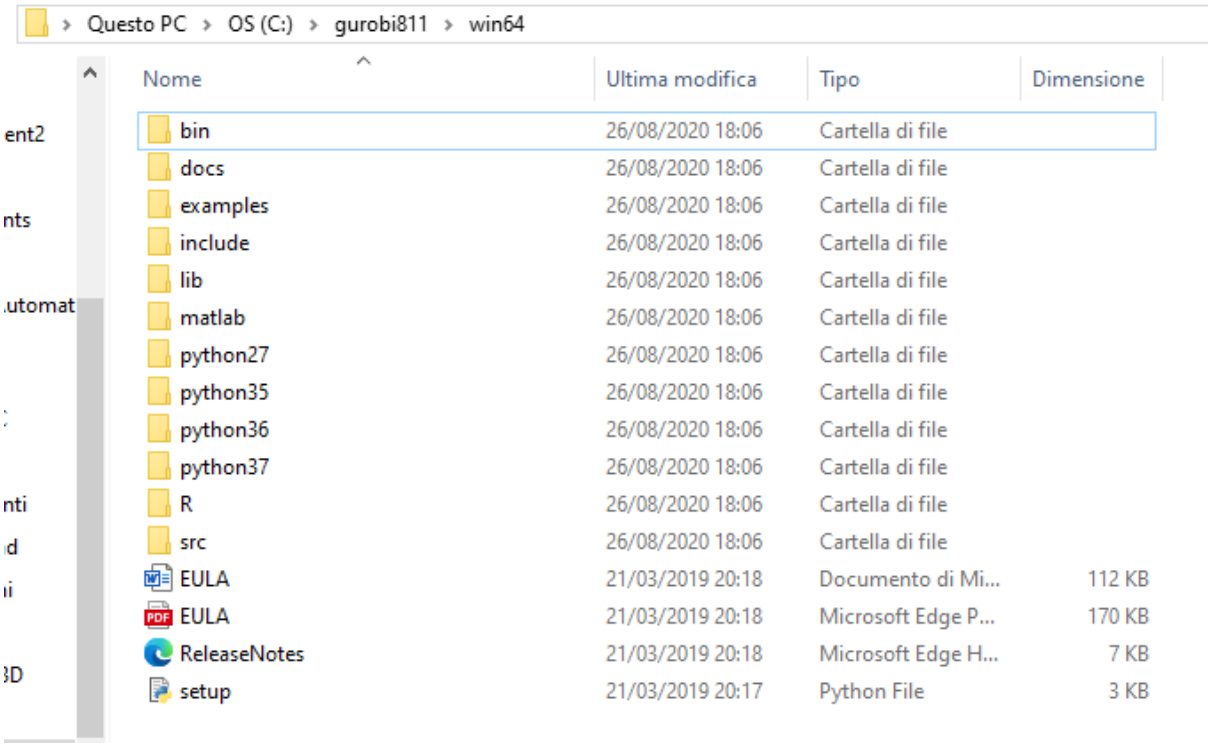
Windows

- Gurobi: https://www.gurobi.com/

After you have registered, go to the section *downloads and licenses,* select Gurobi Optimizer (not the one for AMPL) and then pick the windows version. Now you just need to run the executable file.

Then go to the section *your Gurobi licenses* and follow the instructions on how to install your license (grbgetkey command).

It may be necessary to run the file **setup.py** from the command window using the command **python setup.py install**. To do this, open the command window in the gurobi home folder, after installing it.



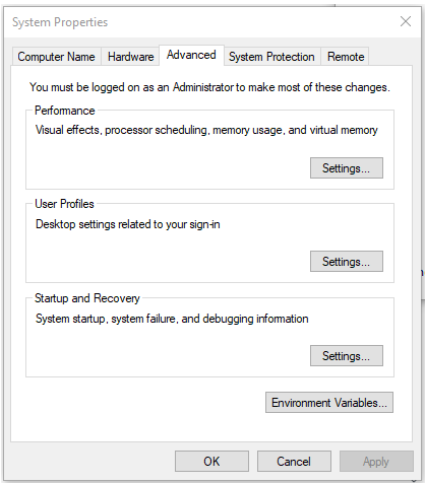
- Z3: the easiest way to install it is through pip, using the command **pip install z3-solver**

Should this not work, you click on this link and follow the instructions.
https://github.com/Z3Prover/z3/releases

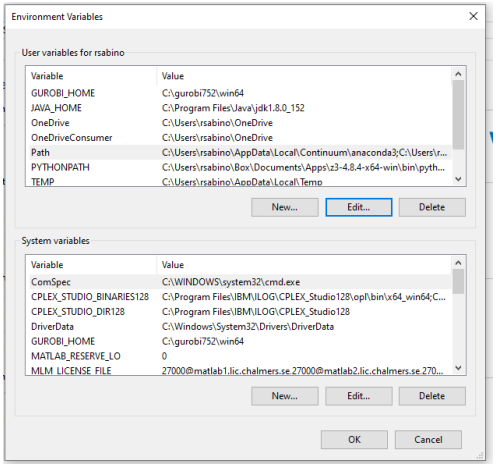
From this page you can download the source code and build z3, though we recommend to download pre-built binaries and use them. All you have to do is select the version you want (the latest for instance) and save it in a safe location on your PC (safe means that you won't move it from there)

After that you have to add the ***bin*** directory to the environmental variable PATH and the ***python*** directory to the environmental variable PYTHONPATH:

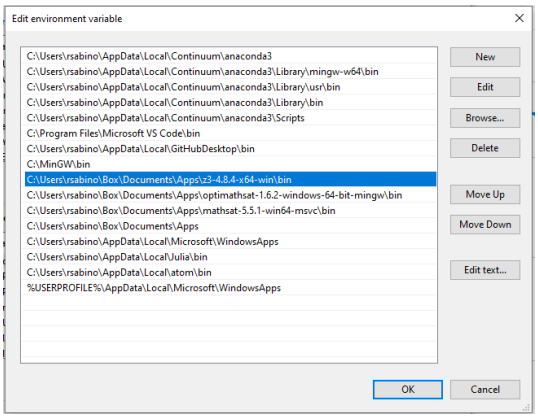
1. Open the control panel;
2. Go to System and Security, then go to System;
3. Click on Advanced system settings and open the section Environmental Variables



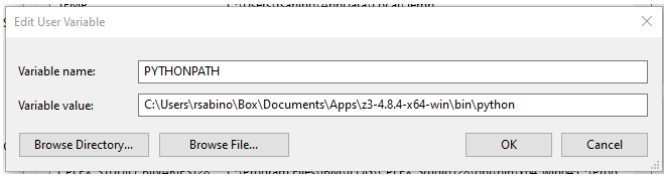
4. In the upper window, select PATH and edit:



5. Add the address on your computer of the bin folder contained in the binary you downloaded



6. Then click on new and create a variable called PYTHONPATH. For the address, use the one of the python folder contained inside the bin folder you just added before.



Mac

- Gurobi: https://www.gurobi.com/

Download the zipfile and run it. Then apply for an academic license and enter the relative command in the terminal.

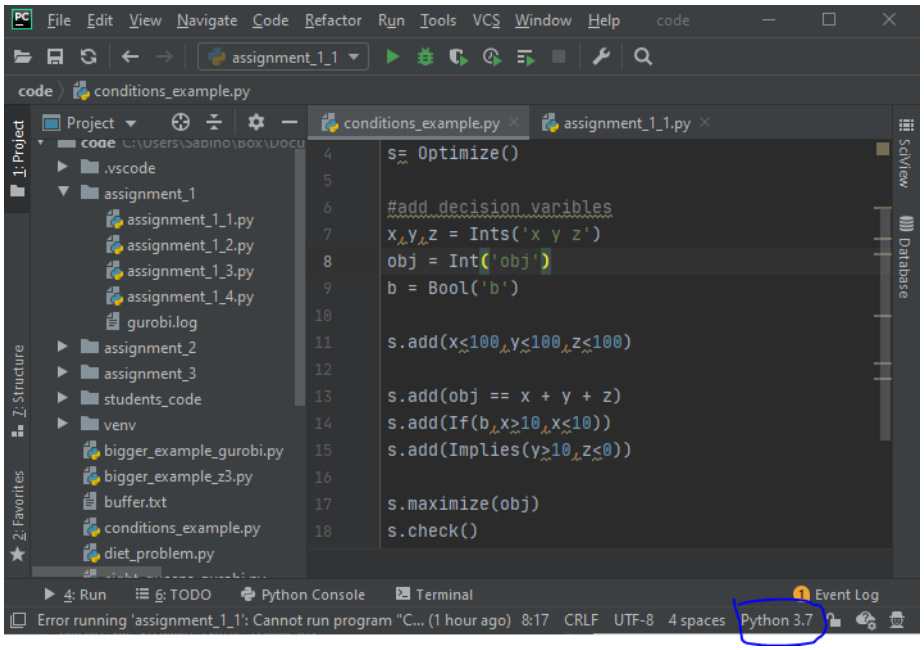
- Z3: https://pypi.org/project/z3-solver/

  Too good to be true…just type in the one command on the link above. If you do not have pip installed on your computer:

  https://www.shellhacks.com/python-install-pip-mac-ubuntu-centos/

PyCharm setup

Make sure you choose the python interpreter where you installed the solvers. This can be done by clicking on the area at the bottom-right of the window.



Additional links you may find useful

A byte of Python: https://python.swaroopch.com/

Gurobi API for Python: https://www.gurobi.com/resource/python-i-webinar/ (the slides you find on the canvas webpage are explained in this video)

Lots of Gurobi examples to play with:
https://www.gurobi.com/documentation/8.1/examples/a_list_of_the_gurobi_examp.html

Z3py tutorial: https://ericpony.github.io/z3py-tutorial/guide-examples.htm

A piece of advice

When installing the solvers, if you run into troubles that are not addressed here, Google can be your best friend (that is how I figure out the instructions above)