

# Informatics for Astronomers - WS2021

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## Exercise sheet 4 - Internet basics and more Python

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*The following will be also part of the assessment:*

*(1) Try to present exercises in a way that everyone can understand (even those who didn't do the exercises), so please explain the vital parts of your solution in a clear way.*

*(2) Try to also include some background information where applicable, and/or explain the possible context/motivation for the given exercise.*

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1. In moodle you can find a `python` script called `portscanner.py` which scans the ports of a host to find out if any of them are open. Execute it, providing `localhost` as a input. How many ports are open?
  - Now open a session of `jupyter notebook` and execute the script again. Do you see a difference?
  - In a separate terminal execute: `python -m http.server` and execute the script again.

What is happening?

2. Use the command `traceroute` to a website of your preference. Describe the output of that command. Use the IP address listed in the output to find out the “physical” route that the packages followed using a geolocation service (e.g. [ipinfo.io](https://ipinfo.io)).
3. Look in PyPi for a `python` package that can perform (text) encryption. Install it in your system and encrypt (and decrypt) the text generated by `import this`
  - After seeing the results, what is encryption useful for?
  - Using the function to calculate the entropy from the previous exercise, evaluate the *entropy* before and *after* the encryption
4. Describe and demonstrate with examples the most common exceptions in python.
5. Use the `ping` command to the server of your preference (e.g. `www.google.com`). Store the results of 100 “pings” in a file. Read that file with python, parse the results so you get a list or array with the ping times. Create an histogram of the ping times with `matplotlib` and statistics with `numpy`.
6. Using the `python` module `timeit`, evaluate the execution time of the function you wrote to find repeated numbers (from the last exercise) vs using the `numpy` library.