TOOL/LANGUAGE SELECTION

TOOLS/LANGUAGES

- Significant number of people who crunch numbers for a living use Microsoft Excel or other spreadsheet programs.
- Others use proprietary statistical software like SAS, Stata, or SPSS.
- While Excel and SAS are powerful tools, they have limitations. Excel cannot handle datasets above a certain size, and does not easily allow for reproducing previously conducted analysis on new datasets.
- SAS and other programs were developed for very specific uses and do not have a large community of contributors constantly adding new tools.

LANGUAGES

- The next step beyond a tool is to learn R or Python.
- These are the two most popular programming languages used by data analysts and data scientists.
- Both are free and open source, and were developed in the early 1990's – R for statistical analysis and Python as a general-purpose programming language.

PYTHON V'S R

- R has a steep learning curve as it is a low level programming language, simple procedures can take longer codes.
- Python is know for it's simplicity.
- Both languages have good data handling capabilities and options for parallel computations.
- Both have advanced graphical capabilities.
- Both get the latest features quickly as they are open source.
- Python has grown in popularity.

PYTHON

- For this module it was appropriate to choose Python as the language for data analytics.
- Easier learning curve than R was a core reason.
- Reuse of Python in other roles not just data analytics a possibility.

ANACONDA

- Anaconda is one of the most popular Python Data Science Platforms available.
- It is an open source distribution.
- Quick and easy to install, run and upgrade complex data science and machine learning environments like scikit-learn, TensorFlow, and SciPy.
- Data Science IDE we will use is spyder providing editing, testing, and debugging features.

ANACONDA DOWNLOAD

- www.anaconda.com/download
- Python 3.7 version for Windows, Mac or Linux
- Installing Python in a terminal can be problematic. Many scientific packages require a specific version of Python to run, and it is difficult to keep them from interacting with each other.
- It is also hard to keep them updated.
- Anaconda distribution makes getting and maintaining these packages quick and easy.

WHAT IS ANACONDA DISTRIBUTION

- Open source, easy to install high performance Python and R distribution, with the conda package and environment manager and collection of 1,000+ open source packages with free community support.
- Included with Anaconda:
  - NumPy – n-dimensional array for numerical computation
  - SciPy – scientific computing library for Python
  - Matplotlib – 2d Plotting library for Python
  - Pandas – powerful Python data structures and analysis toolkit
  - Seaborn – statistical graphics library for Python

PYTHON

- Python is an increasingly popular tool for data analysis.
- In recent years the number of libraries have matured.
- It is a general purpose programming language.
- Python was explicitly designed so code written in Python would be easy for humans to read and to minimize the amount of time required to write code.
- Python requires a little more training to get started but there is no ceiling to what you can do with Python.
- Python has major performance advantages over most other high level languages for analysis including Matlab and R both in terms of computation speed and memory use (R is a notorious memory hog!)

PYTHON

- Things to learn in Python immediately:
  - Data types: integers, floats, strings, Booleans, lists, dictionaries, and sets
  - functions,
  - Loops
  - Mutable (int, float, string, Boolean) vs immutable data types (list, set, dic)
  - Methods to manipulate strings
  - Importing third party modules
  - Reading and interpreting errors.

PYTHON

- Python can be used by command line executing of code, executing a saved file, or interacting with ipython
- iPython (enhanced interactive Python interpreter)
- iPython is a program that sits between the user and Python itself that adds a few bells and whistles to make it a little easier to work with.
- There are many tools/interfaces that use iPython, you tell if your tool uses iPython if you see this prompt style:

```
In [1]: print('hello')
hello
```

PYTHON

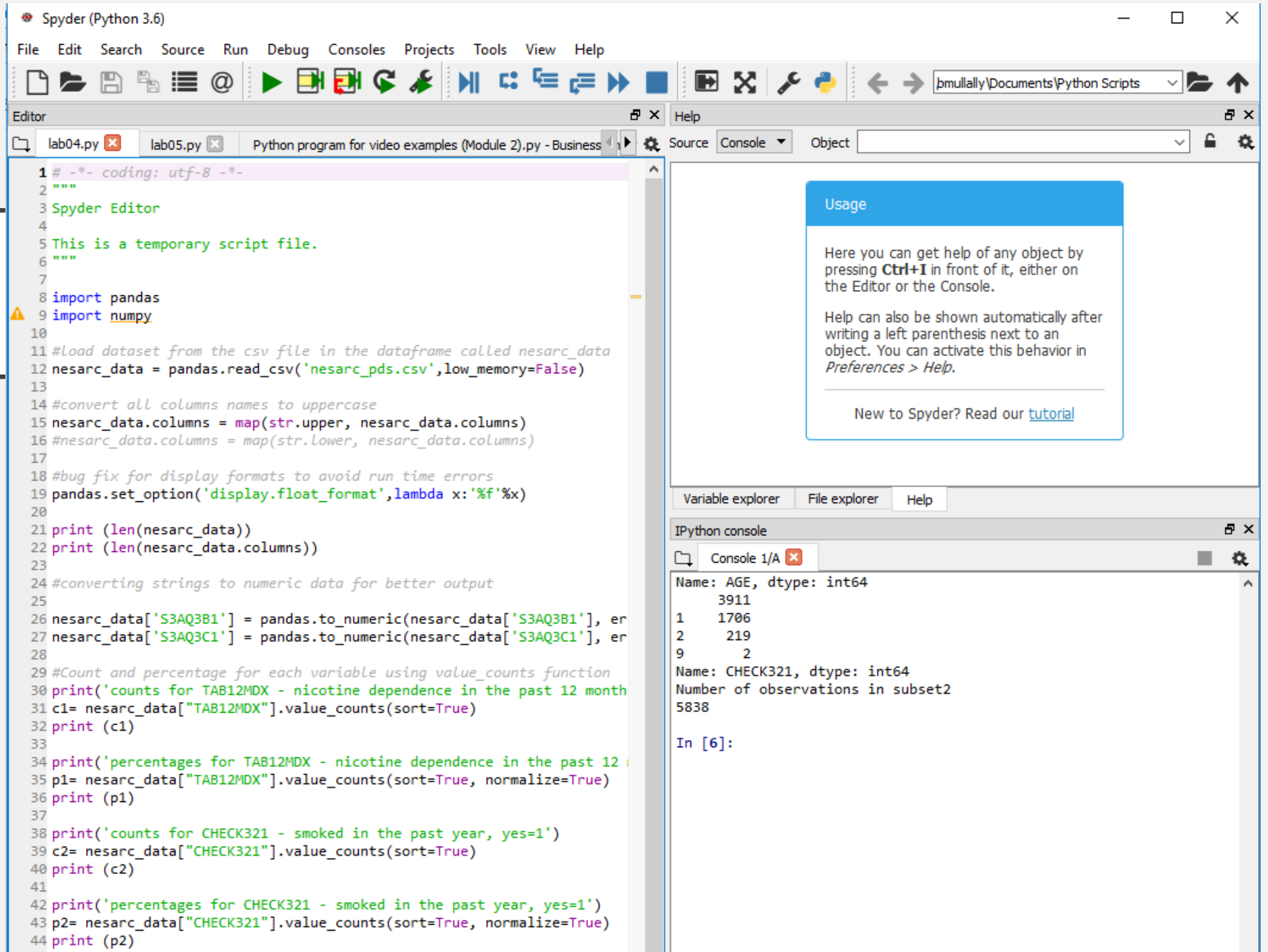
- The other method is to execute a saved file. The file has an extension .py and is run on the command line by typing python filename.py
- Many tutorials available to learn Python, two recommended in the lab:
  - Codeacademy.com/learn/python
  - Datacamp.com/learn-python-with-anaconda

PANDAS

- Python itself does not include vectors, matrices, or dataframes as fundamental data types.
- As Python became more popular it was realised that this was a short-coming and new libraries were created that added these data-types to Python.
- The original library that added vectors and matrices to Python was called numpy, however it had limitations. A new library was created and built on top of numpy, that added all the nice features that we expect, it is called pandas.

SPYDER

- Editor
- Inspector/Help
- Console



PYTHON SYNTAX

- Python is case sensitive.
- Editing colour coded:
  - Blue font indicates a Python keyword.
  - Dark red are for numbers.
  - Green is used for strings.
  - Purple is used for a value in an option value pair.
  - Grey font indicates comments about the program.
- Comments start with a number sign `#` or a `£` symbol and they are not analysed by Python.

RESOURCES

- www.data-analysis-in-python.org
- www.datacamp.com
- www.codeacademy.com