

# Effective Programming Practices for Economists

## Software engineering

### Writing simple (py)tests

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# Reminder of the example

```
>>> raw = pd.read_csv("survey.csv")
>>> raw
```

	Q001	Q002	Q003
0	strongly disagree	agree	python
1	strongly agree	strongly agree	Python
2	-77	disagree	R
3	agree	-77	Python
4	-99	-99	Python
5	nan	strongly agree	Python
6	neutral	strongly agree	Python
7	disagree	agree	python
8	strongly disagree	-99	PYTHON
9	-77	-99	Ypython

From the metadata you know

- Q001: I am a coding genius
- Q001: I learned a lot
- Q003: What is your favourite language
- -77 not readable
- -99 no reply

# First function in clean\_data.py

```
def _clean_agreement_scale(sr):  
    sr = sr.replace({"-77": pd.NA, "-99": pd.NA})  
    categories = ["strongly disagree", "disagree", "neutral", "agree", "strongly agree"]  
    dtype = pd.CategoricalDtype(categories=categories, ordered=True)  
    return sr.astype(dtype)
```

# A function in test\_clean\_data.py

Function's properties:

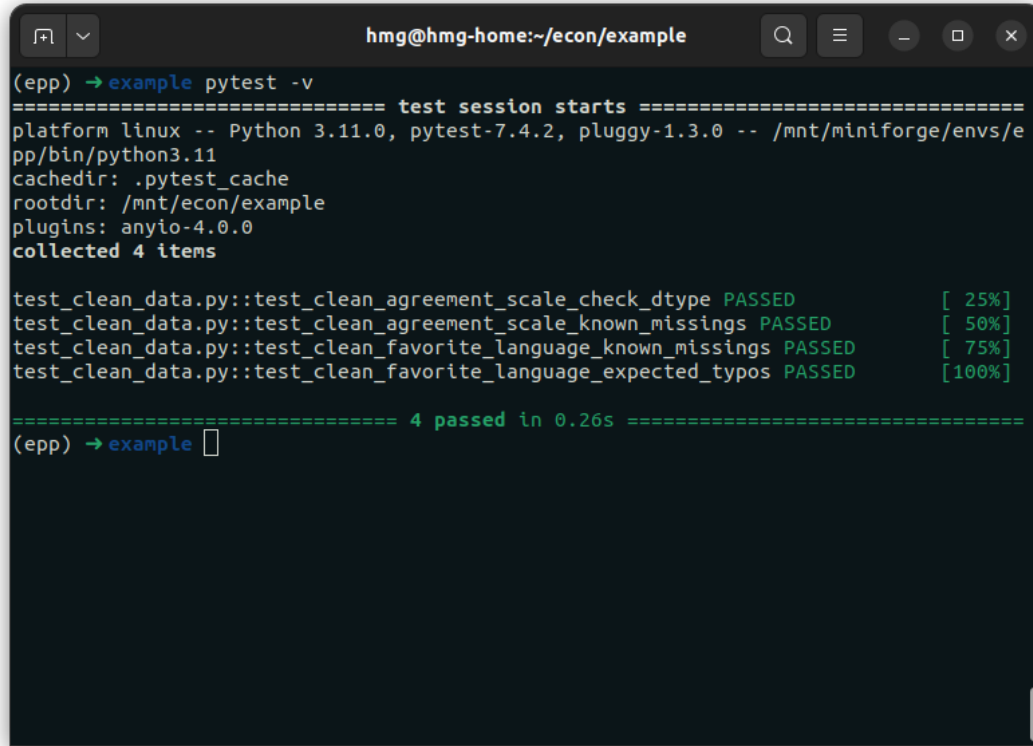
- starts with `test_``
- name explains what it does
- defines what we expect
- calls the function to be tested to calculate actual result
- asserts that actual and expected results coincide

```
def test_clean_agreement_scale_check_dtype():  
    expected = pd.CategoricalDtype(  
        categories=[  
            "strongly disagree",  
            "disagree",  
            "neutral",  
            "agree",  
            "strongly agree",  
        ],  
        ordered=True,  
    )  
    actual = _clean_agreement_scale(pd.Series([])).dtype  
    assert expected == actual
```

# Another function in test\_clean\_data.py

```
def test_clean_agreement_scale_known_missings():  
    result = _clean_agreement_scale(pd.Series(["-77", "-99"]))  
    expected = pd.Series([pd.NA, pd.NA], dtype=result.dtype)  
    pd.testing.assert_series_equal(result, expected)
```

# Run pytest

A terminal window with a dark background. The title bar shows the user 'hmg' at 'hmg-home' in the directory '~/econ/example'. The terminal displays the command '(epp) → example pytest -v' and its output. The output includes session information like platform, Python version, and pytest version, followed by a list of collected items. Four test cases are shown, all passing with progress indicators. The summary line shows '4 passed in 0.26s'. The prompt '(epp) → example' is followed by a cursor.

```
hmg@hmg-home:~/econ/example

(epp) → example pytest -v
===== test session starts =====
platform linux -- Python 3.11.0, pytest-7.4.2, pluggy-1.3.0 -- /mnt/miniforge/envs/e
pp/bin/python3.11
cachedir: .pytest_cache
rootdir: /mnt/econ/example
plugins: anyio-4.0.0
collected 4 items

test_clean_data.py::test_clean_agreement_scale_check_dtype PASSED [ 25%]
test_clean_data.py::test_clean_agreement_scale_known_missings PASSED [ 50%]
test_clean_data.py::test_clean_favorite_language_known_missings PASSED [ 75%]
test_clean_data.py::test_clean_favorite_language_expected_typos PASSED [100%]

===== 4 passed in 0.26s =====
(epp) → example
```

# Basic rules

- Put tests in modules called `test_XXX.py`, with functions `test_YYY_ZZZ`, ...
  - `XXX` is the name of the module to be tested
  - `YYY` is the name of the function to be tested
  - `ZZZ` is a description of the behaviour being tested
- Inside these functions, keep structure clear:
  - Define expected result
  - Calculate actual result
  - Assert that they coincide
- Usually one assert statement per test function