

Factorial Tasks

1. Create the Factorial Program

Write a Python file named `factorial.py`.

The program should compute the factorial of a given non-negative integer.

It must read a single integer from standard input and write the calculated factorial to standard output.

The logic for calculating the factorial should be encapsulated in a function called `compute_factorial(number)`.

The code to read the input, call the function, and print the output should be wrapped in a `main()` function.

Hint: The factorial of 0 is 1. The function should raise a `ValueError` for negative numbers.

2. Test the Core Function

Create a new file named `test_factorial.py`.

Inside, create a `unittest.TestCase` class to test the `compute_factorial` function.

Write at least three different test methods:

`test_valid_input`: Tests that the factorial of a standard positive integer (e.g., 5) is calculated correctly.

`test_invalid_input`: Tests that the function correctly raises a `ValueError` when given a negative number.

`test_boundary`: Tests the boundary condition, ensuring the factorial of 0 is correctly handled.

3. Run Tests from the Command Line

Demonstrate how to use the `unittest` Python package from the command line to:

Run all the tests you've written.

Run only the `test_boundary` test individually.

Run any test whose name contains the substring "valid".

4. Test the Main Function's I/O (Classic Method)

Create a new test case class in `test_factorial.py` to test the `main()` function.

This test should verify both the program's calculation and its interaction with the console.

Emulate the console I/O by using the `setUp` and `tearDown` instance methods to substitute `sys.stdin` and `sys.stdout` with `io.StringIO` objects.

5. Test the Main Function's I/O (Mocking Method)

Create a final test case class that also tests the `main()` function.

Instead of using `setUp/tearDown`, use the `unittest.mock.patch` context manager to manage the mocking of standard input and standard output.