Lab Practice #4: Fast Integer Multiplication using FFT

1 -The deadline for this assignment is **11:59 PM, 27 September 2025**. **10%** penalty per week for being late, and Labs **not accepted** more than **two weeks** late!

2 - Please write your code with possible comments and explanations for each part of your code.

4 - Please send me your source code in **.py** extension, preferably in a zip.

Objective:
Implement fast multiplication of large integers using FFT-based polynomial convolution.

Tasks:
1. Complete starter.py by implementing fft, conv_fft, carry_base, and bigmul_fft.
2. Verify correctness with pytest (see test_lab_fft.py).
3. Compare runtime with naive multiplication and discuss complexity.

Deliverables:
• Completed starter.py
• Short report (in comments) with runtime analysis.

Grading:
Correctness (40%), Implementation (30%), Analysis (20%), Code Quality (10%).