

Ay190 – Worksheet 6
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I worked with Daniel DeFelippis.

1 Problem 1

1.1 Part a)

My code generates the terms in the W matrix, then dots this matrix with the input x array to calculate the Discrete Fourier transform of x . For example, for an input of $x = [1, 2, 3, 4, 5]$, my code calculates $y = [15, -2.5 + 3.4i, -2.5 + 0.8i, -2.5 + 0.8i, 2.5 - 3.4i]$. Python's built-in FFT function gives the same answer.

1.2 Part b), c)

The results of my timing test are shown in Figure 1. My DFT function shows $t \propto N^2$, while the built-in FFT shows very little dependence on N .

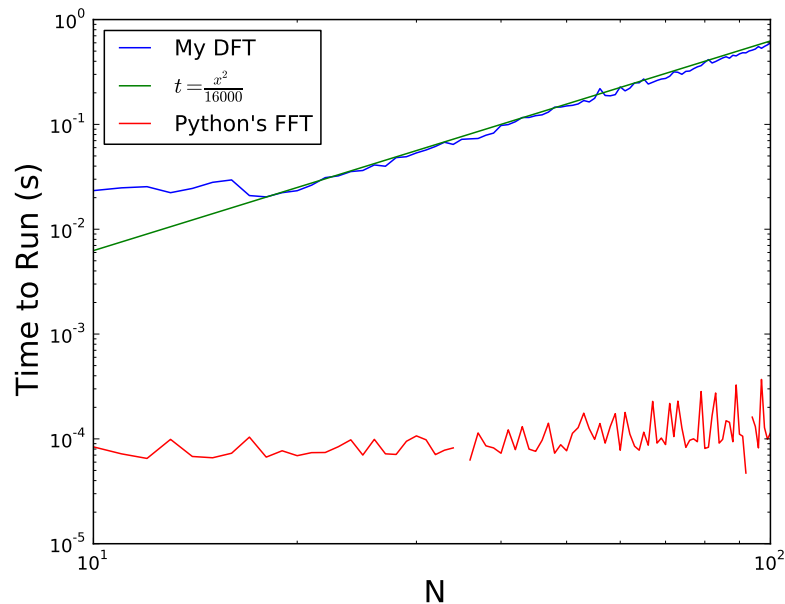


Figure 1: A comparison of the time needed to run my DFT and Python's FFT 10 times on arrays of length N . The green line shows a $t \propto N^2$ dependence for comparison.

1.3 Bonus

I'm confident I'll have the fastest DFT, and it always gives the answer you expect...