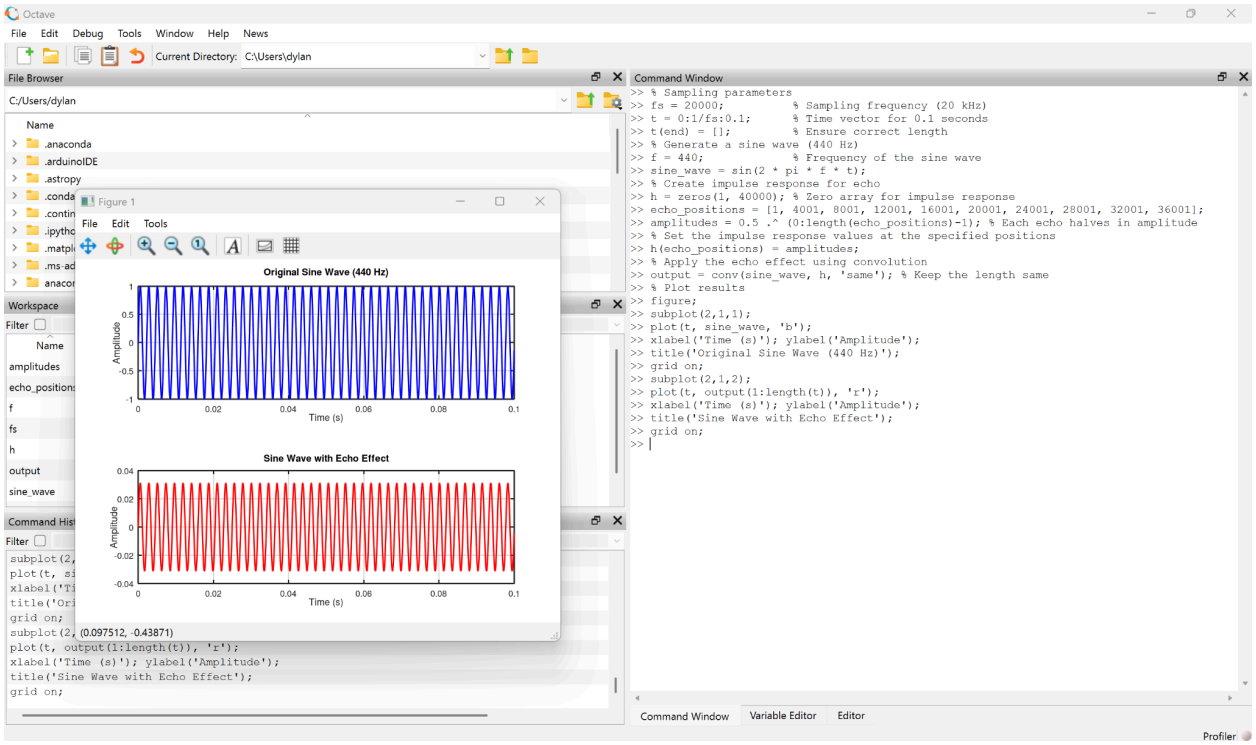
[Preview attachment Note Mar 17, 2025.pdf]

[Note Mar 17, 2025.pdf]
[670 KB]

1.d



Discrete Fourier Transform, Filtering, and Noise

2.

a) As the pulse width decreases, the transitions in the time-domain become sharper, requiring more high-frequency components to describe them. This causes the Fourier spectrum to widen, which is a manifestation of the uncertainty principle.
b) By measuring the time-domain width and the frequency-domain width, and calculating their product for different pulse widths, you find that the product remains constant, which illustrates the uncertainty principle that the time and frequency widths are inversely related.