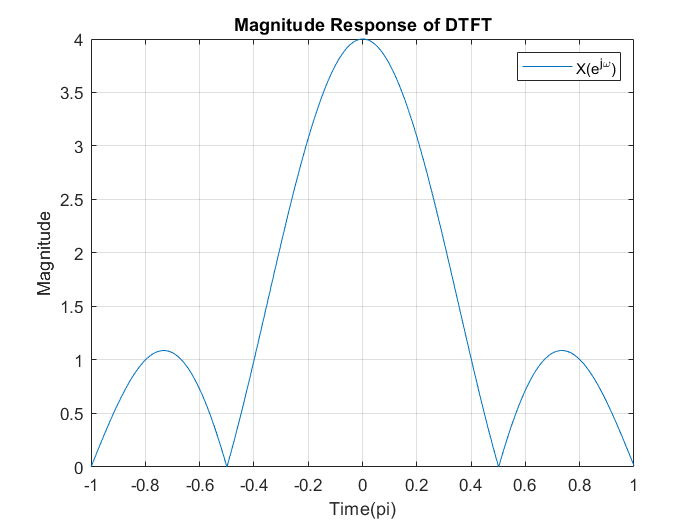
Part I. Paper Assignment

1. This problem examines conversions between various filter specifications. Given the absolute specificationsand,, determine the relative specificationsand, ∆𝜔.

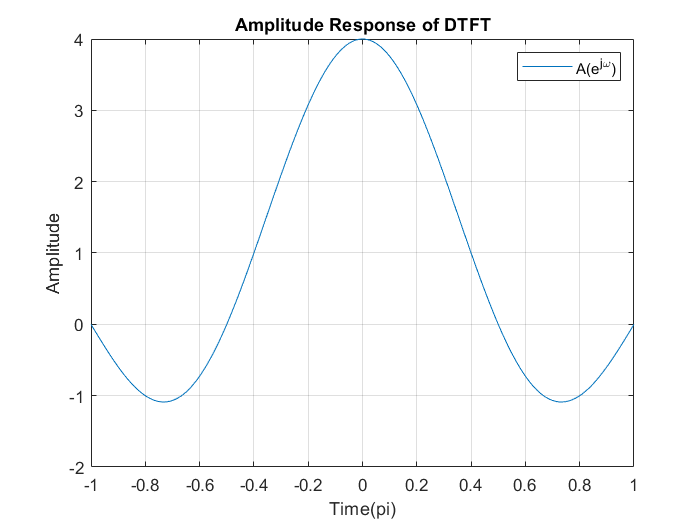
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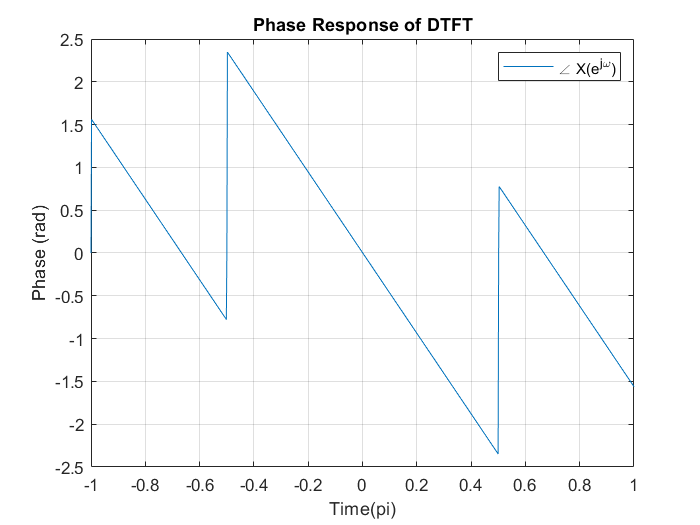
1. The Hann window function can be written as whereis the rectangular window of length M + 1.
2. Express the DTFT of w[n] in terms of the DTFT of.
3. Explain why the Hann window has the wider mainlobe but lower sidelobes than the rectangular window of the same length.

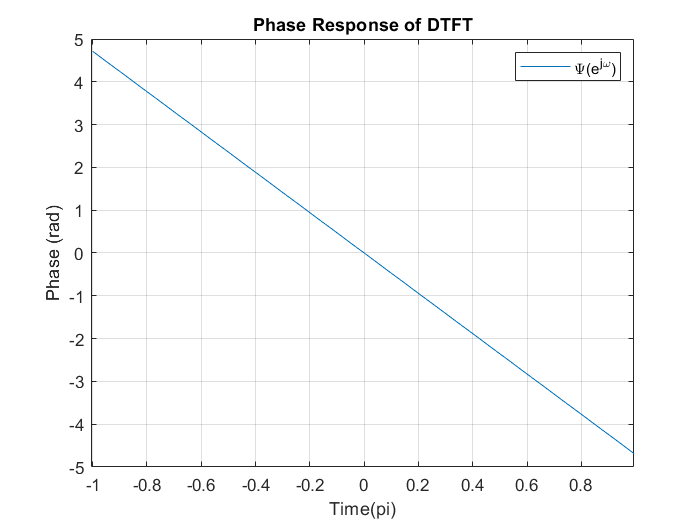
1. Hann window用原本一半的Rectangular window再減掉1/4往左右平移的Rectangular訊號，也因此Hann window會有比較寬的mainlobe和比較小的sidelobes。
2. Consider a FIR filter with impulse response h[n] = u[n] − u[n − 4].
3. Determine and sketch the magnitude response.
4. Determine and sketch the amplitude response. Compare this sketch with that in (a) and comment on the difference.
5. Determine and sketch the phase response.
6. Determine and sketch the angle response. Compare this sketch with that in (c) and comment on the difference.



1. Odd order M; even tap L = M + 1, symmetric 🡪 Type II







1. Consider the type-IV linear-phase FIR filter characterized by antisymmetric impulse response and odd-M.
2. Show that the amplitude responseis given by (10.38) with coefficients d[k] given in (10.39).

(10.38)

(10.39)

1. Show that the amplitude responsecan be further expressed as (10.40) with coefficientsgiven in (10.41).

(10.40)

(10.41)

1. ,



* with