Lab 5 Writing Assignment

Mathematical Derivations

Writing Assignment

In this writing assignment you will learn to write a rigorous mathematical derivation. You will present an FFT calculated using MATLAB of the square wave captured in lab and provide a derivation of the square wave FFT to justify the frequency components and power levels present in the signal.

Learning Objectives

By the end of this writing assignment you will...

- Format and present equations in text
- Write text to support your derivation

Required Resources

- ☐ Figure of an FFT of a square wave using data from the oscilloscope. You may not use the FFT calculated by the oscilloscope. Your FFT should be calculated in MATLAB from the time-domain trace of the square wave.

Specifications

Mathematical Derivations

- ☐ Contain a label that numbers each equation in the derivation
- ☐ Each equation is referenced in the text
- ☐ Variables of the derivations are described in the text
- ☐ Derivations are written out explicitly to show a sequence of steps

- ☐ Steps in the derivation proceed logically from one another in an appropriate level of detail for the audience
- ☐ Refer to appropriate theorems covered in class where appropriate, don't reinvent every wheel

Figures

- ☐ Include FFTs from your measurements for comparison to your theoretical analysis.
- ☐ Proper Axis Labels & Tick Size, Readable: appropriate fonts, line weights and data markers and not overly cluttered, follows other figure conventions from previous weeks.
- ☐ Correct Units on both X and Y Axis.
- ☐ Shows interesting features of frequency spectrum of the tested signal.

Text

- ☐ Refers to each derivation/figure.
- ☐ Correct sentence mechanics like cohesion and coherence between sentences and no run-ons.
- ☐ Correct paragraph mechanics like topic sentences and placement at breaks between ideas.
- ☐ Language is not stilted and jargon is kept to a reasonable minimum.

Technical Inferences in Text

- ☐ Verify the correctness of your theoretical results by referring to FFT Figure, which includes justifying both the power levels and frequency components of your measurement.
- ☐ Use continuous and discrete Fourier transforms and notation where appropriate to discuss the derivation of your transform and your MATLAB plot.
- ☐ Mathematically correct and insightful analysis of your input signal explains the output.