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Math 362 Fourier Analysis

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Class Prep 5

Section 3.5

Key Concepts: In this section, we will see how Fourier coefficient values can be used to construct a frequency domain graph for a given signal . We will use MATLAB to produce the plots. We will also discuss how to interpret the information found in a frequency domain graph.

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| >> [x,sr]=audioread('aah.wav');  >> SoundWaveTimeFreq(x,sr,0.5,0.54,60,160) |  |

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| >> a0=2;  >> a=[2,2,0,0,0,0,0,0];  >> b=[0,0,0,0,0,0,0,0];  >> timefreqplot(a0,a,b,-1,6) |  |
| >> a0=1;  >> a=[2,0,0,0,6,0,0,0];  >> b=[0,0,0,0,0,0,4,4];  >> timefreqplot(a0,a,b,-10,12) |  |
| >> boxtimefreq(32) |  |
| >> sawtoothtimefreq(32) |  |

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| >> tenttimefreq(8) |  |
| >> smoothfcntimefreq(8) |  |

Section 3.6

Key Concepts: In this section, we will revisit the periodic extension of a signal , and use the degree of smoothness observed in the graph of to estimate the asymptotic behavior of the Fourier coefficients. In this way, we connect the smoothness of the graph in the time domain with the end behavior of the graph in the frequency domain. We will also learn what frequency blurring is and why it usually occurs in the frequency domain graph.

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| >> boxtimefreq(32) |  |
| >> sawtoothtimefreq(32) |  |
| >> tenttimefreq(8) |  |

|  |  |
| --- | --- |
| >> smoothfcntimefreq(8) |  |
| >> [x,sr]=audioread('aah.wav');  >> AahTimeFreq(x,sr,0.5,0.54,60,160) |  |
| >> [x,sr]=audioread('aah.wav');  >> SoundWaveTimeFreq(x,sr,0.5,0.54,60,160) |  |
| >> n=length(x);  >> x(1)  ans =  0.0413  >> x(n)  ans =  0.0670 |  |

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| >> freqblurringchord(440,554.37,659.26,0.02) |  |