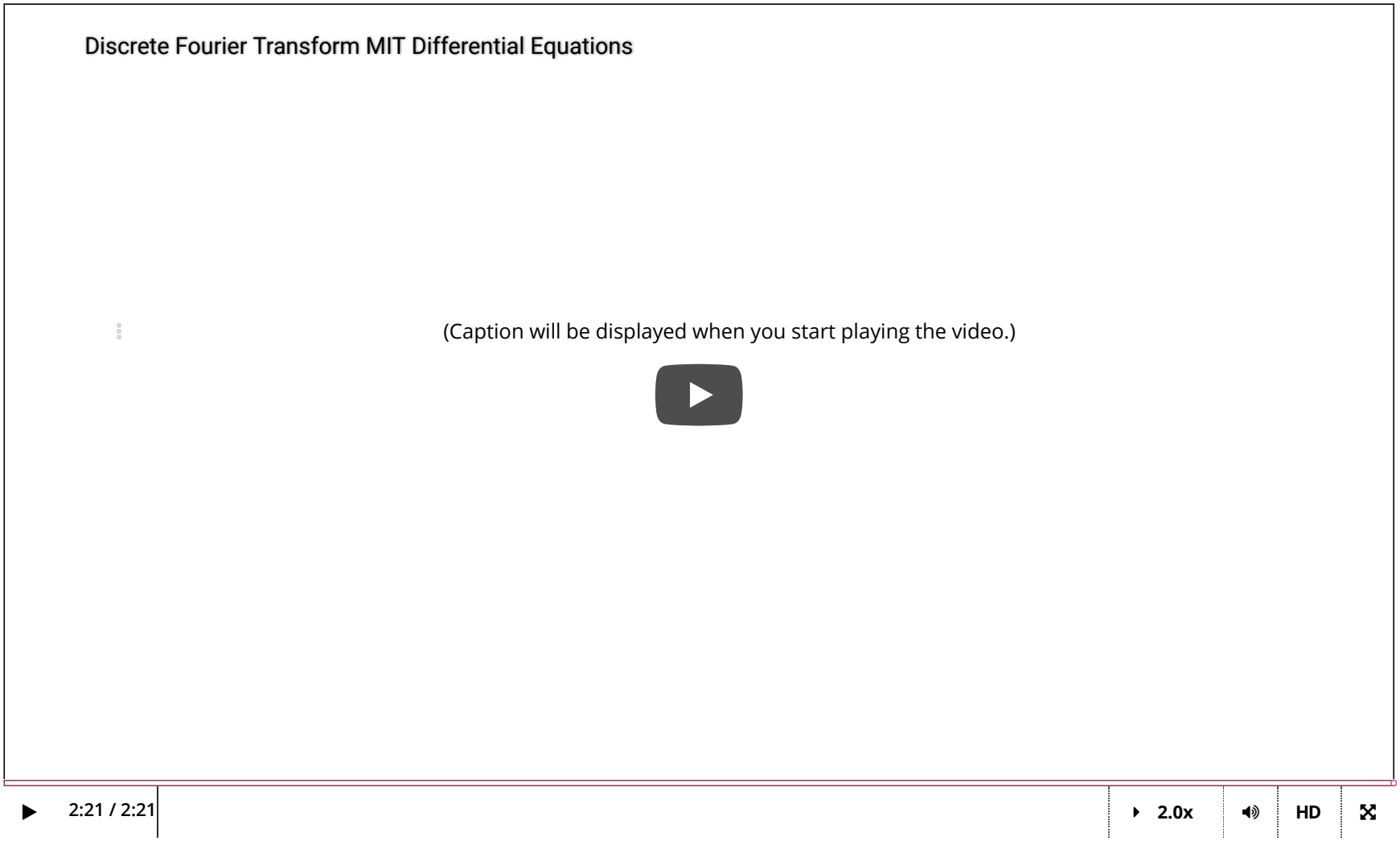
5. DFT in MATLAB
Discrete Fourier Transform

Discrete Fourier Transform MIT Differential Equations

(Caption will be displayed when you start playing the video.)



Plotting FFT for real signals (External resource) (1.0 points possible)

Finding the frequencies in a signal

In this problem, we'll apply the Fast Fourier Transform (FFT) to find and plot the frequencies in our guitar sound signal. The template code extracts the signal from 30% to 50% of the original data. Follow the procedure in the video to plot the single-sided frequency spectrum of the signal. In particular, you need to

- Find the Fourier Transform of **`signal`** and store the result in the variable **y**
- Calculate the single-sided magnitude spectrum as in the video in the variable **yMag**
- Create a vector, **`f`**, representing the frequencies of **yMag**

Script

Save Reset MATLAB Documentation (https://www.mathworks.com/help/)

```
[signal,Fs] = audioread('1803_musicdata_guitar1.wav');
signal = signal(:,1);
L = length(signal);
signal = signal(round(L*0.3):round(L*0.5));

% Copy the procedure in the video to get the single sided spectrum
y = fft(signal);
yMag = abs(y);
N = length(yMag);
f = 0 : (Fs/N) : (Fs/2);
yMag = yMag(1:length(f));

% This code plots yMag as a function of f
% You can comment out this code if necessary while building your solution
figure
plot(f,yMag,'-*');
title('Single-Sided Amplitude Spectrum')
xlabel('f (Hz)')
ylabel('|c_n(f)|')
set(gca,'fontsize',18)
xlim([0,1000])

```

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Topic: Unit 1: Fourier Series / 5. DFT in MATLAB

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? Why do we do abs(y)? 2

'To create amplitudes in the frequency domain' is the answer given in the video, but I'm not sure I understand what that means.

☑ Why is the maximum extractable frequency Fs/2? 6

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