

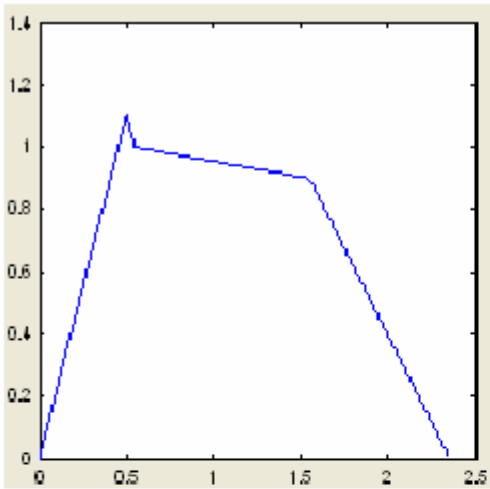
Functional Verification

EE 2304 Signal Generation Using Sinusoids and Wave Shaping

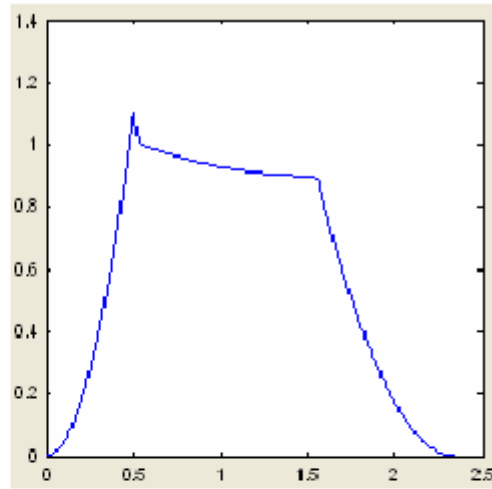
Demonstrate familiarity with the WAVEGEN Graphic User Interface

1. Generate a 420 Hz tone for 3 seconds. TA Initials _____
2. Plot 6 ms of the 420 Hz signal created in item 1 TA Initials _____
3. Identify the ADSR filter profile from the graphic below

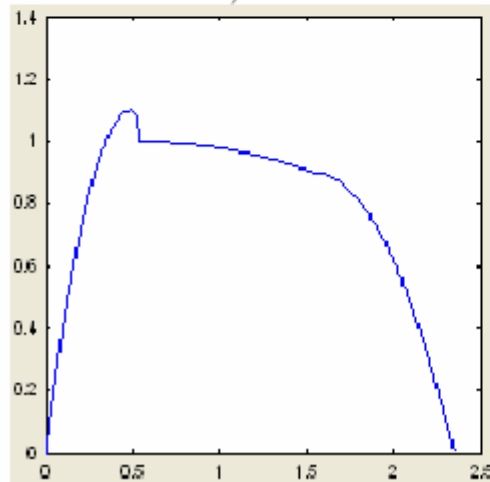
Quadratic 2 _____ Exponential _____ Linear _____ Quadratic 2 _____



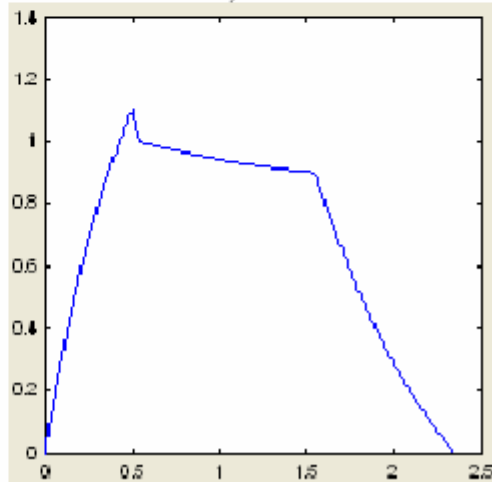
a)



b)



c)



d)

TA Initials _____

Generating Waveforms

Write a MATLAB function named gensin TA Initials _____

1. Launch wavegen by typing its name at MATLAB command prompt.
2. Check the C1 box in the Fourier coefficients panel.
3. Set the fundamental period so that the signal would have a frequency of 440Hz, this would generate an A tone.
4. Set the wave duration to 2 seconds.
5. Set the sampling frequency to 22050 Hz.
6. Press the show 1st harmonic button and update the plot by either of the update buttons.
7. Play the sound of the sinusoid waveform you have generated.
8. Change the frequency of the sinusoid to 880 Hz and 220 Hz and listen to the sound, what is your deduction?

Generating a Square and Triangle wave:

1. Compute the first five Fourier series coefficients and phases for a 440 Hz Square wave. Note: Normalize the coefficients by dividing each one by the value of their largest.
2. Check the C1 box in the Fourier coefficients panel and set the magnitude and phase of the 1st harmonic.
3. Set the wave duration, sampling frequency and fundamental period as in steps 3-5 from last section.
4. Turn real-time update on.
5. Turn show 1st harmonic on.
6. Turn show sum on.
7. Play the sound.
8. One by one enable the other coefficients starting from C2, set their corresponding harmonic magnitude and phase.
9. Note the change in the shape of the sum as you enable more harmonics. Listen to the sound after adding each harmonic to the sum and note the difference in sound.

TA Initials _____

Repeat these steps for a triangular waveform.

TA Initials _____

Shaping the Envelope

Listing 2. Function piecegen TA Initials _____

Listing 3. Function ADSRgen TA Initials _____

Run Wavegen with student piecegen and ADSRgen TA Initials _____

Set a Linear ADSR for the following $A = 0.05$, $D = 0.05$, $S = 0.05$, $R = 0.04$ and a wave duration of 1s.

Approximating a Piano Tone

Type at MATLAB command prompt: `[tone, FS, NBITS] = wavread('tone.wav')`

Plot the waveform of the sound

Estimate the fundamental period of the sound from the plot. Run `wavegen` and set the fundamental period. Try to set the ADSR parameters so that the envelope would look similar to the envelope of the piano tone.

TA Initials _____