Introduction to Simulink

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- **Name:**   **Lab Date:**

- **Student No.:**   **Day of the week:**   **Time:**

- **Name:**   **TA Signature:**

- **Student No.:**   **Grade:**

1. Matlab Exercises

1.1 Creating and Plotting a Sinusoid
a. *Re-write the program to plot three periods of your 1KHz sine wave.* **(0.5pt)**

1.2 Listening to a Sine Wave
a. *Play the program and hear the 1KHz sine wave.*

b. *Change the frequency to 500Hz and play it again.*

c. *Now change it to hear 2KHz and play it again.*

d. *Now change back to 10KHz and explain what you have observed/heard.* **(1.0pts)**

e. *As you doubled the voltage, what is the change in dB of the signal as measured at the load? Note that the dB you are calculating does not represent sound pressure; you are only comparing voltages.* **(0.5pts)**

1.3 Audio Signal Processing
a. *What is the duration of the guitar signal in seconds?* **(1.0pts)**

b. *Play the combined bass, drums, and guitar sound and have TA sign below* **(1.0pts)**

c. *Synthesize gradual increase of guitar volume with bass and drums volume staying constant, and have TA sign below* **(1.0pts)**

2. Simulink

2.1 First Simulink Model

    a. *Show the TA a clear 1KHz sine wave with 1/48000 sampling time displayed on your* `Simulink` *scope.* (**1.0pts**)

2.2 The Four Operations

2.2.1 Adding and Subtracting a Constant to/from Sinusoid

    a. *Show the TA a positive DC shift of 2 on your* `Simulink` *scope.* (**1.0pt**)

2.2.3 Operating on Two Sines

    a. *Show to the TA on your* `Simulink` *scope the resulting addition of 2 sinusoids: a 1Vp, 1KHz and a $\frac{1}{2}$Vp, 2KHz. Use the slider gain blocks to assign the magnitudes for the 2 sinusoids.* (**1.0pt**)

2.2.4 Multiplying Two Sines

    a. *Show to the TA your working (and sounding) model that multiplies two sinusoids: a 31.25Hz and a 500Hz, both with amplitude 1.* (**1.0pt**)

2.3 Signal Spectrum Visualization via DSP Toolbox

    a. *Explain verbally the relationship between the peaks on the frequency spectrum and the sinuoid with DC bias signal to your TA and have the TA sign in the box below.* (**1.0pt**)