

# Introduction to Simulink

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| • 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)

#### 2.2.2 Gain

- a. Apply a 10dB gain to your sine wave and show it to the TA on the Simulink scope. (1.0pt)

#### 2.2.4 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)

#### 2.2.5 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)