

# MAT 202

## Problem Set 1

1. Determine if the following systems are linear or non-linear

a)  $y[n] = x[n^2]$                       b)  $y[n] = e^{x[n]}$

2. Determine if the following systems are causal or non-causal

a)  $y[n] = \sum_{k=-\infty}^n x[k]$               b)  $y[n] = x[n] + 3x[n + 4]$               c)  $y[n] = x[-n]$

3. Determine if the following systems are time variant or time invariant

a)  $y[n] = x[-n]$                       b)  $y[n] = x[n] - x[n - 1]$

4. MATLAB Exercise

a) Write a MATLAB program to generate a sinusoidal sequence  $x[n] = 2\sin(\frac{\pi}{8}n)$  and plot 50 samples

b) Determine the period of the sequence

c) Write a MATLAB program to generate an exponential sequence  $y[n] = 0.5e^{0.05n}$  and plot 50 samples

d) Compute  $w[n]=x[n].y[n]$  and plot 50 samples of the output.