

EE 341 - Homework 2**Due September 7, 2005**

For problems which require MATLAB, please include a MATLAB m-file which shows how you made your plots.

1. In each of the following systems, $x(t)$ is the input and $y(t)$ is the output. Classify each system in terms of linearity, time invariance, memory, and causality. Justify your answers

(a) $y(t) = x(t) \cos(2\pi f_o t)$ (Amplitude modulation)

(b) $y(t) = \cos[2\pi f_0 t x(t)]$ (Frequency modulation)

(c) $y(t) = x(4t)$

(d) $y(t) = x^2(t) + 2x(t + 1)$

(e) $\frac{d^2 y(t)}{dt^2} + 3\frac{dy(t)}{dt} = 2\frac{dx(t)}{dt} + x(t)$

(f) $\frac{d^2 y(t)}{dt^2} + \cos(st)\frac{dy(t)}{dt} = 2x(t)$

2. In each of the following systems, $x[n]$ is the input and $y[n]$ is the output. Classify each system in terms of linearity, time invariance, memory, and causality. Justify your answers

(a) $y[n] - y[n - 1] = 2x[n] - x[n - 1]$

(b) $y[n] - y[n - 1] = 2x[n + 2] - x[n + 1]$

(c) $y[n] = 3^n x[n]$

(d) $y[n] = x[n] + \cos[0.5\pi(n + 1)]$

3. Problem 1.33.

4. Problem 2.1 (b) (e).

5. Problem 2.9.