**EEL 3135: Signals and Systems**

**Practice Exam**

**Problem 1:**

Given a periodic signal ,where

 

For ,

1. Plot x(t).
2. Expand x(t) in trigonometric Fourier series
3. Calculate the average power of x(t).

Hint: the average power of a periodic signal with period T0 is 

**Problem 2:**

Let  the Fourier Transform of the impulse response of an RC circuit and  an input to that circuit.

1. Find  the Fourier Transform of x(t).
2. Form the product  the Fourier Transform of the output y(t).
3. Find y(t) as the Inverse Fourier Transform of .
4. Find the RC product such that the amplitude of y(t) is .

Hint: remember 

**Problem 3:**

A system is described by the following second-order linear differential equation

$$\frac{d^{2 }y}{dt^{2}}+3\frac{dy}{dt}+2y\left(t\right)=f(t)$$

where $y\left(0^{-}\right)=2 , y^{'}\left(0^{-}\right)=-8, and the input f\left(t\right)=\left(t^{2}+3t\right)u(t).$

Solve the differential equation using the Laplace Transform method

**Problem 4**

Consider the following circuit, in which *v*in(t) = 5u(t), *v*C1(0-) = 3 V, *v*C2(0-) = 0 V, and *i*L(0-) = 2 A. Find *v*out(t).

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