

Instructions: This is an open-book, open-notes exam. Laptops may be used for access to reference material only. You have exactly 50 minutes to complete the exam.

1. Given the following periodic signal

$$x(t) = \sum_{n=-\infty}^{\infty} x_p(t - 2n)$$

where

$$x_p(t) = \begin{cases} e^{-t} & 0 < t < 1 \\ 0 & \text{else} \end{cases}$$

- (a) Sketch the signal.
 - (b) What is the Fourier Series representation in exponential form?
 - (c) What is the Fourier Transform of the signal?
2. Let $x(t) = e^{-2t^2}$, determine the Fourier Transform of $2x(t - 1)$.
3. For a system whose impulse response is

$$h(t) = (1 - e^{-5t})u(t)$$

Determine the response in the time domain when the input is $x(t) = \cos(10t + 5)$.

4. Given the following circuit, what is the voltage across the capacitor as a function of time when the input voltage is $x(t) = \sin(t)$? You can use any method you like. Note carefully the orientation of the voltage source.

