ELEC 2120 Name:_____
Final Exam, **Version A**: 12/03/20, 8:00 am – 10:00 am.

Instruction for the Final Exam

Please join the Zoom session https://auburn.zoom.us/j/81216180184 at or before 7:50 am 12/03/20 and turn on the camera during the final exam.

NOTE 1: Providing **steps** is likely helpful for you to get more points.

NOTE 2: Any communications with any other student are **strictly forbidden** during the final exam.

NOTE 3: There are multiple versions of the final exam. Each student will be working on one version.

You can download the problems after 7:50 am. After 10:00 am, you have 20 extra minutes to prepare for the submission.

One additional step is required when you submit the final exam. Before leaving the range of the camera, you need to follow one of the following two choices:

Choice 1: First send photos of all your solutions to yzs0078@auburn.edu, then you can leave the range of the camera and prepare a pdf file for grading. The solutions in the photos and in the pdf file must match. Mismatched part will not be graded.

Choice 2: Or you can prepare a pdf file for grading and submit the pdf file in front of the camera.

You should submit the pdf file through Canvas. If it is difficult to submit on Canvas, you can send it to yzs0078@auburn.edu.

1. (20 points)
Provide **short** answers to the following questions.
(a). (5 points) Let $h(t)$ be the impulse response of a linear and time-invariant system. Explain how to compute the ramp response of this system.

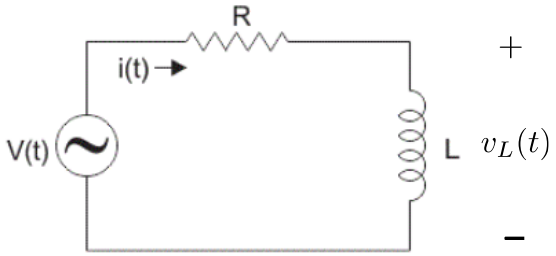
(b). (5 points) Compute the integral $\int_{-1}^{3} \delta(t-2) + u(t-1)dt$

(c). (10 points) Consider a system $y(t) = 4\, x(t\text{-}2)^2$, where $x(t)$ is the input signal and $y(t)$ is the output signal.

Is this system linear? _____

Is this system time-invariant? _____

2. (20 points)
Consider the following RL circuit, where $R = 2\Omega$ and $L = 1$ H. Compute the voltage $v_L(t)$ on the inductor, for the following two cases:
(a) (10 points) The source voltage signal is $V(t) = \delta(t)$ V.
(b) (10 points) The source voltage signal is $V(t) = u(t)$ V.



3. (20 points)
Two signals $x(t)$ and $h(t)$ are given by $x(t) = u(t) - u(t-1)$ and $h(t) = u(t) - u(t-3)$
(a) (8 points) Plot $x(t)$ and $h(t)$.
(b) (8 points) Compute the convolution $y(t) = x(t) * h(t)$
(c) (4 points) Plot $y(t)$.

4. (20 points)
An LTI system is described by a transfer function given by $H(s) = \dfrac{1000}{(1+s)(1000+s)}$

(a). (10 points) Compute the impulse response of this system.
(c). (10 points) Draw the gain (magnitude) Bode plot of the transfer function.

5. (20 points)
Compute the Fourier Transform of signal $x(t) = u(t) - u(t-2) + 1$