King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE207: Signals & Systems (111)
Quiz 2: System Modeling in Time Domain

Serial #

-1 points for not writing your serial #

Dr. Ali Hussein Muqaibel

Name: Ver.1

A system is defined by the following input-output relationship: $y(t) = 5x(t-2) + 10$.

Is the system causal or non-causal? Justify your answer (no points without justifications) **(2 points)**

Causal because current output depends on the input before 2 seconds and not on future input.

For example $y(t=5)$ depend on $x(t=3)$

A system is defined by the following relation between the input, $x(t)$, and the output, $y(t)$: **(4 points)**

$$\frac{dy}{dt} + 3y + 2 \int_{-\infty}^{t} y(\beta)d\beta = x(t)$$

Is this system **fixed** or time-varying?................................

Is this system **dynamic** or instantaneous?.......................

Is this system **linear** or non-linear?.............................

What is the order of this system?........**2** (you must first differentiate to write the relation in the standard form)

No need for justification for this part just choose

Consider a linear fixed system (LTI) with impulse response, $h(t) = \frac{1}{3}e^{-t/3}u(t)$, **(4 points)**

a) What is the step response?

$$a(t) = \int_{-\infty}^{t} \frac{1}{3}e^{-\beta/3}\ u(\beta)\ d\beta = -\left[e^{-\beta/3}\right]_{0}^{t}\ u(t) = \left[1 - e^{-t/3}\right]u(t)$$

b) What is the output if the input is $x(t) = 2u(t-5)$?

By linearity, the output will be $2\left[1 - e^{-(t-5)/3}\right]u(t-5)$

Good luck, **Dr. Ali Muqaibel**