

**LAHORE UNIVERSITY OF MANAGEMENT SCIENCES**  
**Department of Electrical Engineering**

**EE310 Signals and Systems**  
**Quiz 3**

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**Name:** \_\_\_\_\_

**Campus ID:** \_\_\_\_\_

**Total Marks:** 10

**Time Duration:** 20 minutes

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**Question 1** (7 marks)

Let

$$x(t) = (t - 1)[u(t - 1) - u(t - 2)]$$

be a ramp signal defined over the interval  $1 \leq t \leq 2$ , and

$$h(t) = u(t + 1) - u(t - 1)$$

be a rectangular pulse defined over  $-1 \leq t \leq 1$ .

- (a) [1 mark] Clearly sketch  $x(t)$  and  $h(t)$ .
- (b) [5 marks] Compute the convolution

$$y(t) = x(t) * h(t)$$

by carefully determining the limits of integration.

- (c) [1 mark] Sketch and label the final output  $y(t)$ .

**Question 2** (3 marks)

Consider two continuous-time LTI systems connected such that the output of the first is the input of second system. The first system has an impulse response

$$h_1(t) = e^{-t}u(t).$$

The second system is a differentiator with input ( $x(t)$ ) and output ( $y(t)$ ) related by

$$y(t) = \frac{d}{dt}(x(t))$$

Find the output of the second system if the input to the first system is a unit step function. (Hint: Convolution is commutative.)