

# ELECTRICAL ENGINEERING DEPARTMENT

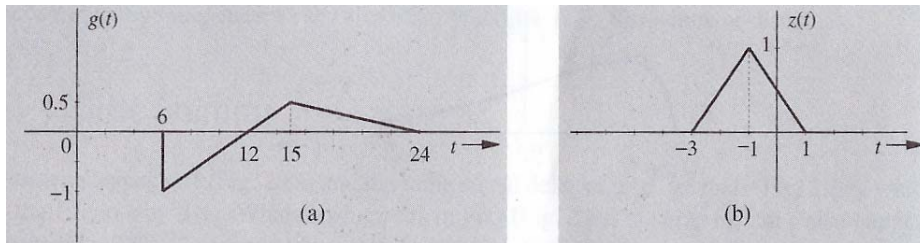
## EE207: Signals & Systems

**Tutorial # 1**

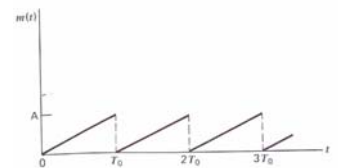
**033**

**Dr. Ali Muqaibel**

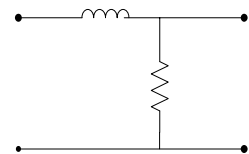
1. Given the following signals  $g(t)$  and  $z(t)$ , sketch  $g(3t)$  and  $z(t/2)$



2. Write the following signal in terms of singularity functions



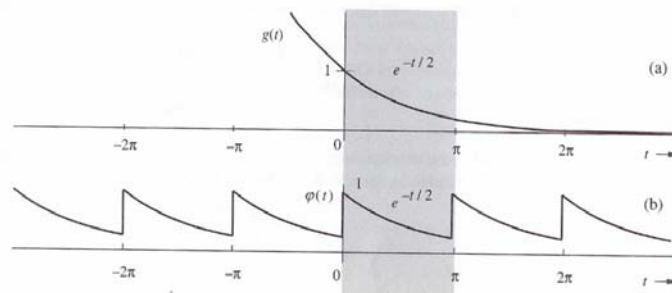
3. For the system shown in the figure
- Find the differential equation relating the output,  $y(t)$ , to the input  $x(t)$ .
  - What is the order of the system?
  - Is the system fixed or time varying (Why)?
  - Find the impulse response of the system?
  - Find the step response of the system?



4. The impulse response of a system is  $h(t) = 4e^{-5t}u(t)$ . Use convolution to determine the output when the input  $x(t)$  is (a)  $2e^{-3t}u(t)$  and (b)  $2e^{-5t}u(t)$ .

**Answer:** (a)  $4(e^{-3t} - e^{-5t})u(t)$ , (b)  $8te^{-5t}u(t)$

5. Find the trigonometric Fourier series for the exponential  $e^{-t/2}$  shown in the figure over the interval  $0 \leq t \leq \pi$



**Answer:**  $\varphi(t) = 0.504 \left[ 1 + \sum_{n=1}^{\infty} \frac{2}{1+16n^2} (\cos 2nt + 4n \sin 2nt) \right]$

6. Find the exponential Fourier series for the signal shown above.

**Answer:**  $\varphi(t) = 0.504 \sum_{n=-\infty}^{\infty} \frac{1}{1+j4n} e^{j2nt}$

7. Sketch the spectrum of the signal above.  
8. What is the percentage of power up to the third harmonics?