

# ECE 341 - Homework #6

LaPlace Transforms, Continuous Probability Density Functions. Summer 2024

## LaPlace Transforms

1) Let X and Y be related by the following transfer function:

$$Y = \left( \frac{2s+30}{(s+5)(s+8)} \right) X$$

a) What is the differential equation relating X and Y?

b) Determine y(t) assuming

$$x(t) = 3 \cos(5t) + 2 \sin(5t)$$

c) Determine y(t) assuming x(t) is the unit step function (0 for  $t < 1$ , 1 for  $t > 0$ )

$$x(t) = u(t)$$

2) Let X and Y be related by the following transfer function

$$Y = \left( \frac{2s+30}{(s+1+j6)(s+1-j6)} \right) X$$

a) What is the differential equation relating X and Y?

b) Determine y(t) assuming

$$x(t) = 3 \cos(5t) + 2 \sin(5t)$$

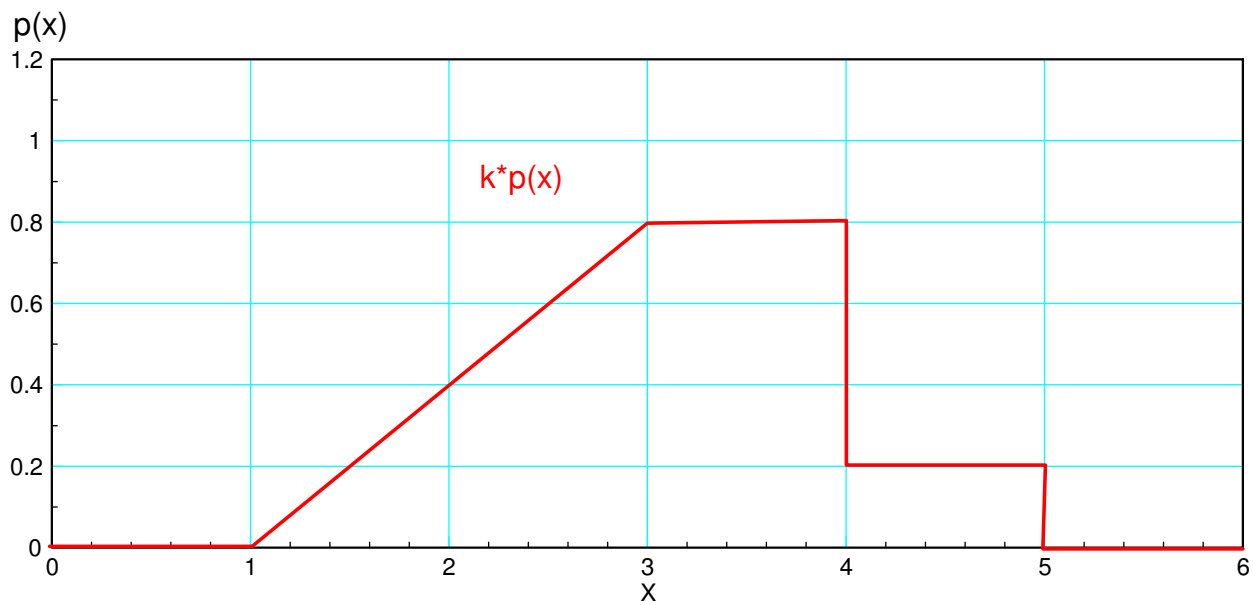
c) Determine y(t) assuming x(t) is the unit step function (0 for  $t < 1$ , 1 for  $t > 0$ )

$$x(t) = u(t)$$

## Continuous Probability Density Functions

(over)

## Continuous Probability Density Functions



- 3) Determine the scalar so that the above function is a valid pdf (i.e. the total area is 1.000)
- 4) Determine the corresponding cdf
- 5) Using Matlab, find 20 random values of  $x$  for the above pdf
- 6) Find the moment generating function for  $p(x)$