

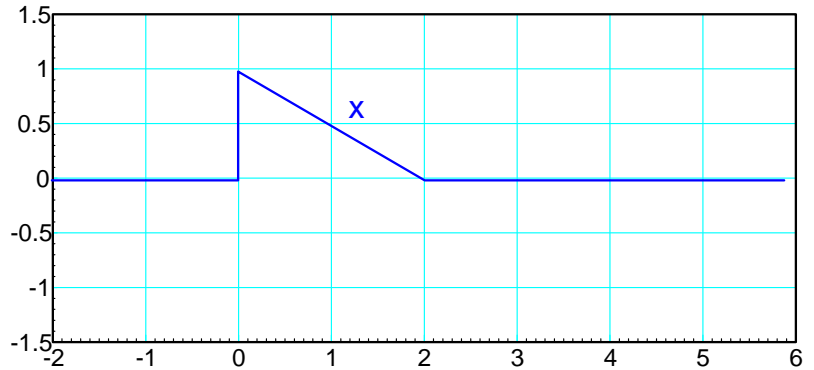
# ECE 311 - Homework #11

## Properties of LaPlace Transforms

Use the properties of LaPlace transforms to find the LaPlace transform for the following functions:

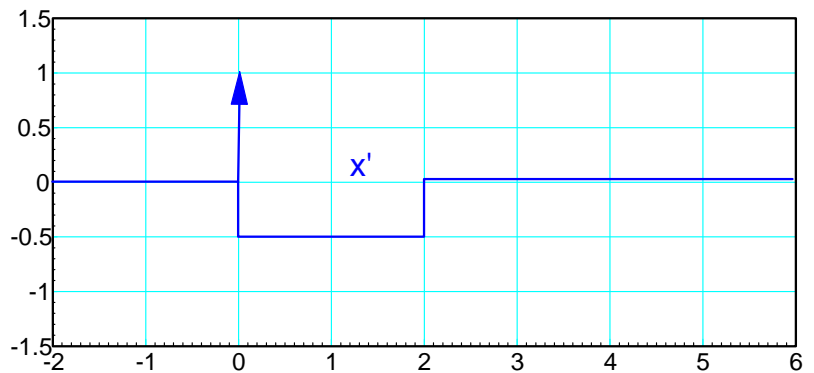
Problem 1) Find  $X(s)$

Take the derivatives until you get delta functions



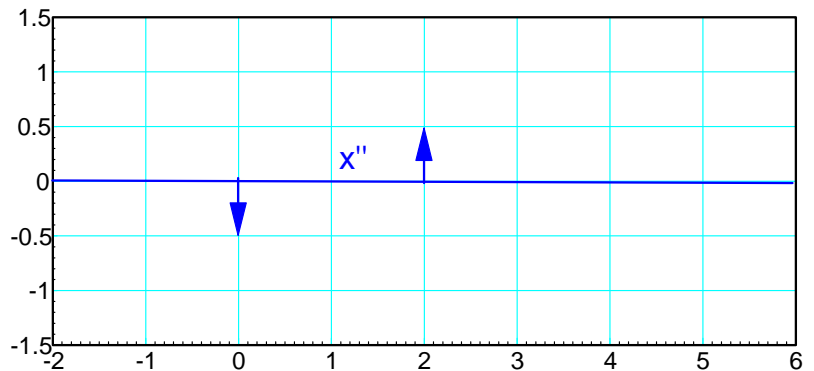
$$\frac{dx}{dt} = \delta(t) + \dots$$

$$sX = 1$$



$$\frac{d^2x}{dt^2} = -0.5\delta(t) + 0.5\delta(t-2)$$

$$s^2X(s) = -0.5 + 0.5e^{-2s}$$



Total Answer:

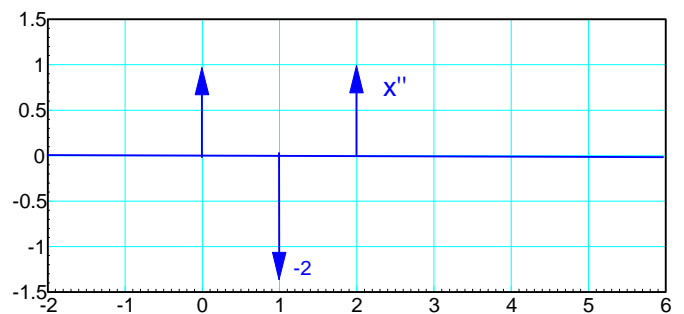
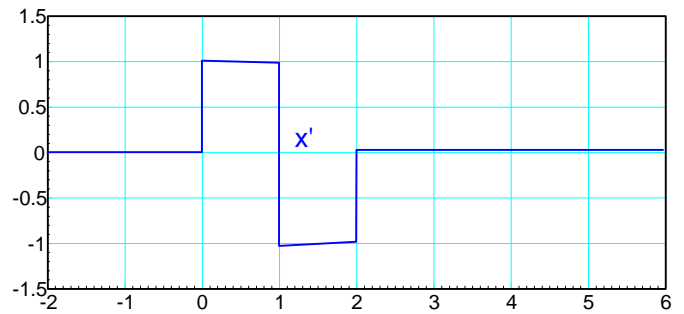
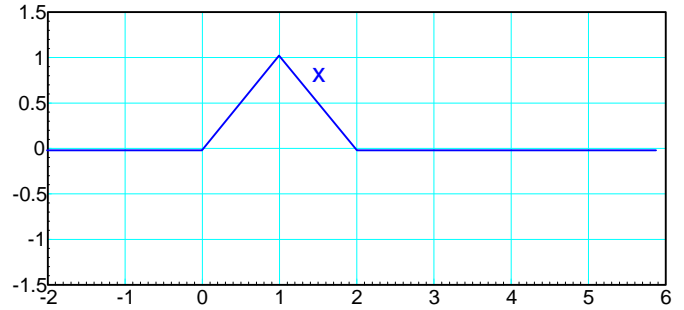
$$X(s) = \left(\frac{1}{s}\right) + \left(\frac{-0.5+0.5e^{-2s}}{s^2}\right)$$

Problem 2) Find X(s)

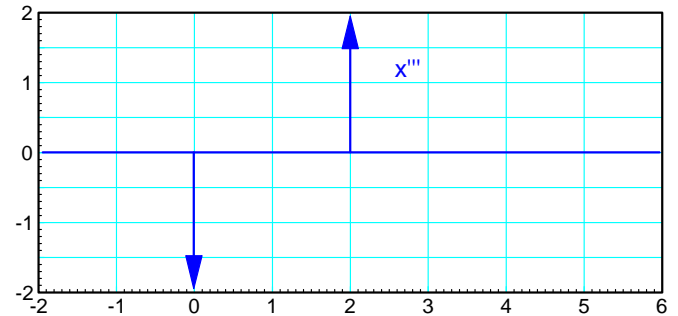
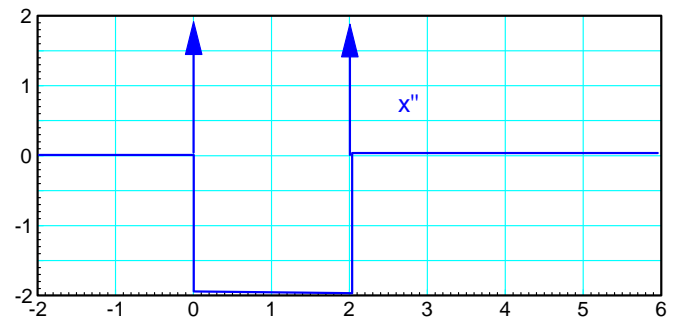
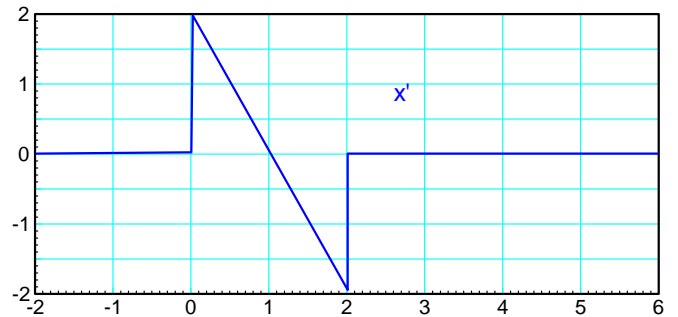
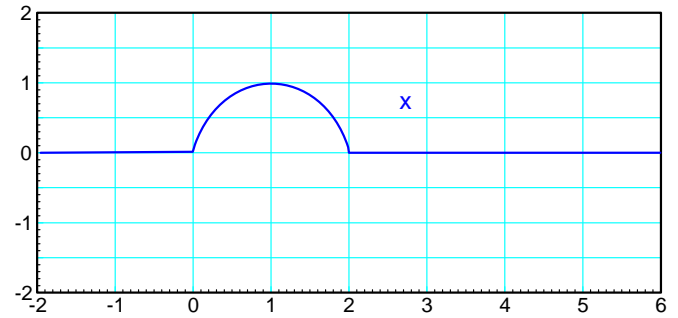
$$x'' = \delta(t) - 2\delta(t-1) + \delta(t-2)$$

$$s^2 X = 1 - 2e^{-s} + e^{-2s}$$

$$X = \left( \frac{1 - 2e^{-s} + e^{-2s}}{s^2} \right)$$



Problem 3) Find X(s)



$$x'' = 2\delta(t) + 2\delta(t-2) + \dots$$

$$s^2 X = 2 + 2e^{-2s}$$

$$x''' = -2\delta(t) + 2\delta(t-2)$$

$$s^3 X = -2 + 2e^{-2s}$$

Total Answer

$$X = \left( \frac{2+2e^{-2s}}{s^2} \right) + \left( \frac{-2+2e^{-2s}}{s^3} \right)$$