

Signals and Systems problem for the Fall 2012 MS Exam in ECE

Suppose a causal, linear, time-invariant system with input $x(t)$ and output $y(t)$ is described by the differential equation

$$\frac{d^2y}{dt^2} - \frac{dx}{dt} + 5\frac{dy}{dt} = x - 6y$$

Find the output $y(t)$ when the input is $x(t) = 2\delta(t - 1) - 4e^{-4t+4}u(t - 1)$, where δ is the Dirac delta function and u is the unit step function.