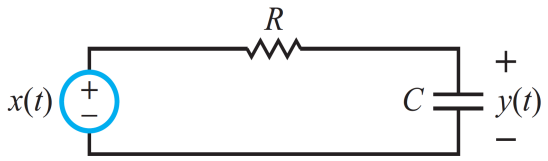
ECE 3337: Signals & Systems Analysis, Class Worksheet 14

1. (40 pts) For the following RC circuit, calculate the following outputs for $x(t) = 25\cos(3t)u(t)$ when $R = 250k\Omega$, $C = 1\mu F$, and an initial capacitor voltage of 1V.



a. Zero-input response
b. Zero-state response
c. Transient response
d. Steady-state response
e. Natural response
f. Forced response

2. (40 pts) Given an LTI system with an impulse response $h(t) = 2\delta(t) + e^{-4t}\sin(2t)\,u(t)$, determine the following:

a. $\mathbf{H(s)}$
b. $\hat{\mathbf{H}}(\omega)$
c. Poles and zeros of the system
d. LCCDE description of the system
e. Output response $y(t)$ to input $x(t) = 2te^{-5t}u(t)$. Assume zero initial conditions.

3. (20 pts) Rewrite the following circuit in the **s**-domain.
Initial conditions: Capacitor voltage = 1V. Inductor current = 0.1A