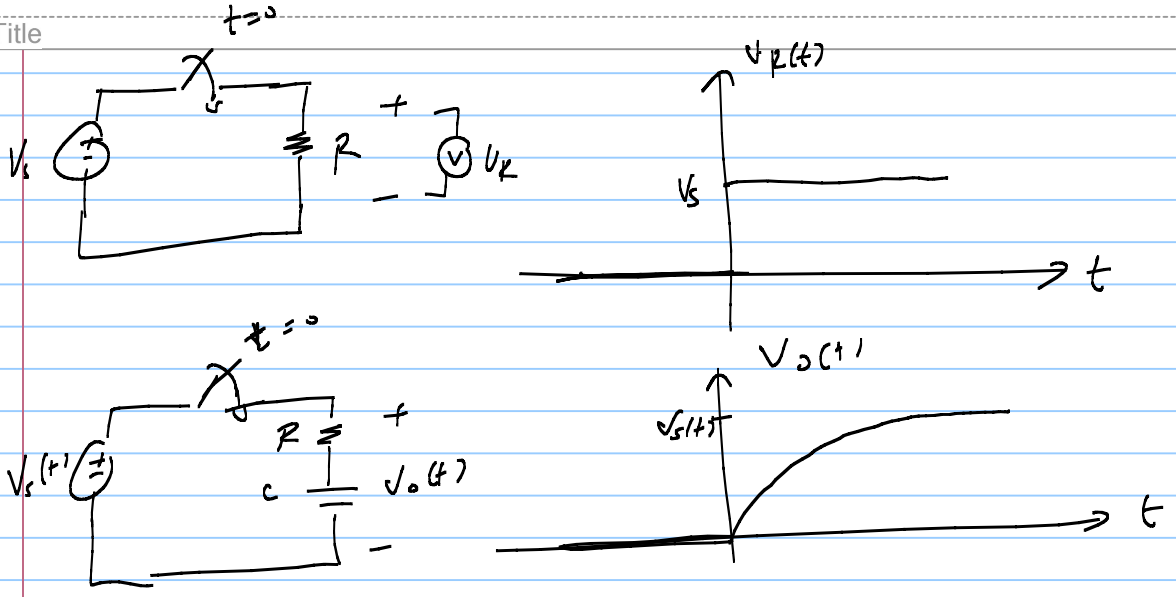
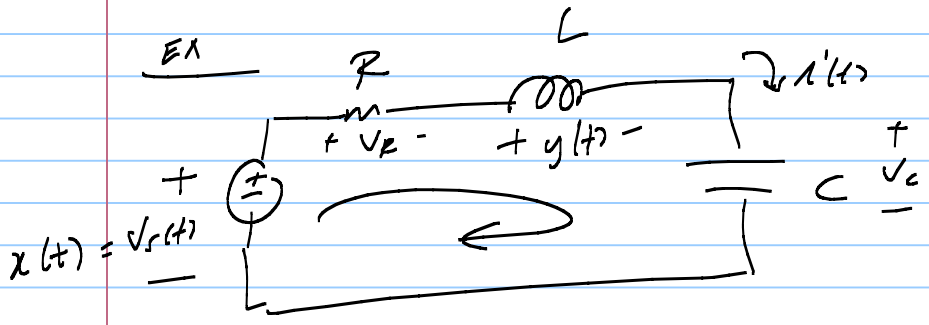
EE 362 Spring 2019

Note Title 2/12/2019



EX



$$-x(t) + V_R(t) + y(t) + V_c(t) = 0$$

$$\lambda'(t) = \frac{V_R(t)}{R} \quad ; \quad \lambda'(t) = C\frac{dV_c(t)}{dt} \rightarrow V_c(t) = \frac{1}{C}\int \lambda'(t)\,dt$$

$$V_R(t) = R\lambda'(t) \qquad y(t) = L\frac{d\lambda'(t)}{dt} \rightarrow \int y(t)\,dt = L\lambda'(t)$$

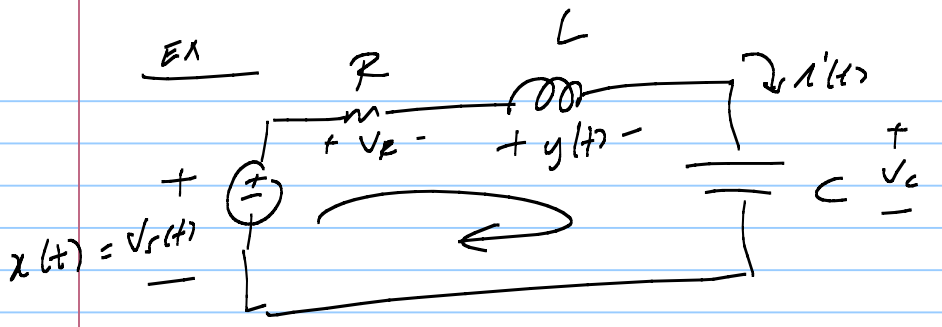
$$-x(t) + R\lambda'(t) + L\frac{d\lambda'(t)}{dt} + \frac{1}{C}\int \lambda'(t)\,dt = 0$$

$$-\frac{dx(t)}{dt} + R\frac{d\lambda'(t)}{dt} + L\frac{d^2\lambda'(t)}{dt} + \frac{1}{C}\lambda'(t) = 0$$

$$-\frac{dx(t)}{dt} + \frac{R}{L}y(t) + \frac{dy(t)}{dt} + \frac{1}{LC}\int y(t)\,dt = 0$$

$$-\frac{d^2x(t)}{dt^2} + \frac{R}{L}\frac{dy(t)}{dt} + \frac{d^2y(t)}{dt^2} + \frac{1}{LC}y(t) = 0$$

Ex



$$y(t) = L \frac{di(t)}{dt}$$

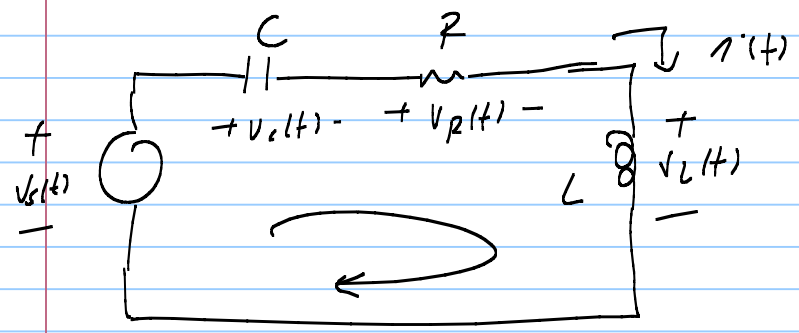
$$-x(t) + V_R(t) + y(t) + V_c(t) = 0$$

$$-x(t) + Ri(t) + L\frac{di(t)}{dt} + \frac{1}{C}\int i(t)\,dt = 0$$

$$-\frac{dx(t)}{dt} + R\frac{di(t)}{dt} + L\frac{d^2i(t)}{dt^2} + \frac{1}{C}i(t) = 0$$

$$-\frac{d^2x(t)}{dt^2} + R\frac{d^2i(t)}{dt^2} + L\frac{d^3i(t)}{dt^3} + \frac{1}{C}\frac{di(t)}{dt} = 0$$

$$\boxed{-\frac{d^2x(t)}{dt} + \frac{R}{L}\frac{dy(t)}{dt} + \frac{d^2y(t)}{dt^2} + \frac{1}{LC}y(t) = 0}$$



$$x(t) = V_s(t)$$

$$y(t) = V_R(t)$$

$$i(t) = \frac{V_R(t)}{R} = \frac{y(t)}{R}$$

$$-x(t) + V_c(t) + y(t) + V_L(t) = 0$$

$$-x(t) + \frac{1}{C}\int i(t)\,dt + y(t) + L\frac{di(t)}{dt} = 0$$

$$-\frac{dx(t)}{dt} + \frac{1}{C}i(t) + \frac{dy(t)}{dt} + L\frac{d^2i(t)}{dt^2} = 0$$

$$-\frac{dx(t)}{dt} + \frac{1}{RC}y(t) + \frac{dy(t)}{dt} + \frac{L}{R}\frac{d^2y(t)}{dt^2} = 0$$

$$\frac{d^2y(t)}{dt} + \frac{R}{L}\frac{dy(t)}{dt} + \frac{1}{2C}y(t) = \frac{R}{L}\frac{dx(t)}{dt}$$