THE UNIVERSITY OF TEXAS AT SAN ANTONIO
EE 3413
ANALYSIS AND DESIGN OF CONTROL SYSTEMS

QUIZ # 4
Ahmad F. Taha
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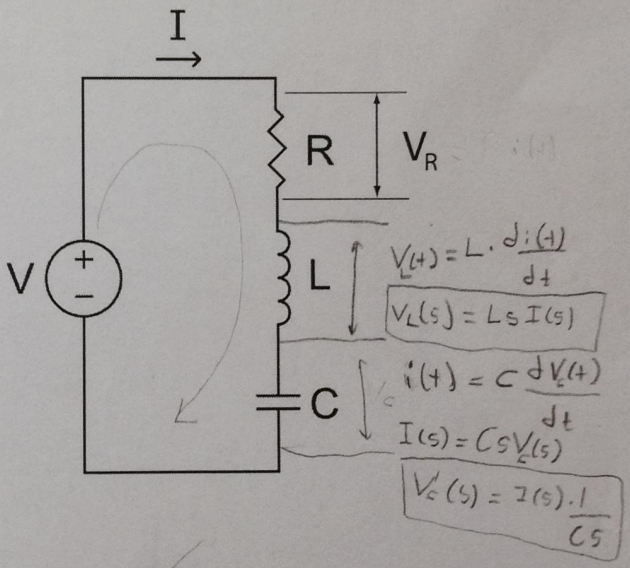
Name: Solutions

For the circuit shown below find the transfer function $\frac{V_R(s)}{V(s)}$ in terms of R, L, and C.

$$V(t) = R\,i(t) + L\frac{di(t)}{dt} + \frac{1}{C}\int i(t)\,dt$$

$\xrightarrow{LT}$

$$V(s) = R\,I(s) + L\,s\,I(s) + \frac{1}{C}\frac{I(s)}{s}$$



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

$V_L(s) = L\,s\,I(s)$

$i(t) = C\frac{dV_c(t)}{dt}$

$I(s) = C\,s\,V_c(s)$

$V_c(s) = I(s)\cdot\frac{1}{Cs}$

$$V_R(t) = R\,i(t)$$

$\xrightarrow{LT}$

$$V_R(s) = R\,I(s)$$

$$\frac{V_R(s)}{V(s)} = \frac{R\cdot I(s)}{R\,I(s) + L\,s\cdot I(s) + \frac{1}{C}\frac{I(s)}{s}} = \frac{R\cdot I(s)}{I(s)\left(R + sL + \frac{1}{Cs}\right)} = \frac{R}{R + sL + \frac{1}{Cs}}$$