Mon April 5
- o Submit HW0
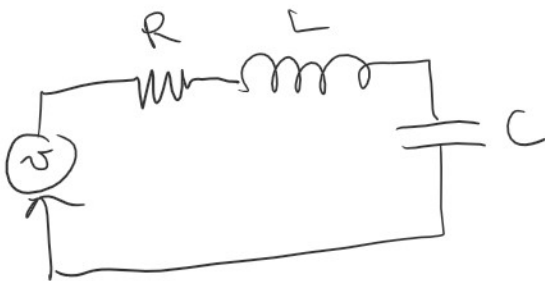- o watch week 1 lectures.

Tutorial
- o sympy
- o RLC
- o OH

To Do
- o group work on Wed
- o HW1 due Fri@5p
- o week 2 lectures

KVL

$$V_S - V_R - V_L - V_c = 0$$

$$V_S - iR - L\frac{di}{dt} - \frac{q}{C} = 0 \qquad i = \frac{dq}{dt}$$

$$V_{(t)} = \frac{dq}{dt}R + L\boxed{\frac{dq^2}{dt^2}} + \frac{q}{C}$$

(DE) $v = \ddot{q}L + \dot{q}R + \frac{1}{C}q$

$\downarrow$ laplace transform

$$v = Ls^2q + Rsq + \frac{1}{C}q$$

(transfer function)

$$G_{qv}(s) = \frac{output}{input} = \frac{q}{v} = \frac{1}{Ls^2 + Rs + 1/C}$$

(block diagram) input $\longrightarrow$ ☐ TF $\longrightarrow$ output

$v \longrightarrow$ ☐ G_{qv} $\longrightarrow q$

$$v \rightarrow \boxed{G_{qv}} \rightarrow q$$

$$\underbrace{\phantom{v \rightarrow G_{qv} \rightarrow q}}$$

$$P(s)$$

q_{des}
desired
amount
of charge.

Coulombs

$e = q - q_{des.}$

$r \rightarrow \oplus \rightarrow \boxed{C(s)} \xrightarrow{\text{voltage}} \oplus \rightarrow \boxed{P(s)} \rightarrow q$

v

$\boxed{-1}$

voltage

RLC circuit

• Stray magnetic field
• thermal
• electromagnetic field → motor.
  ↳ electric field from other wires
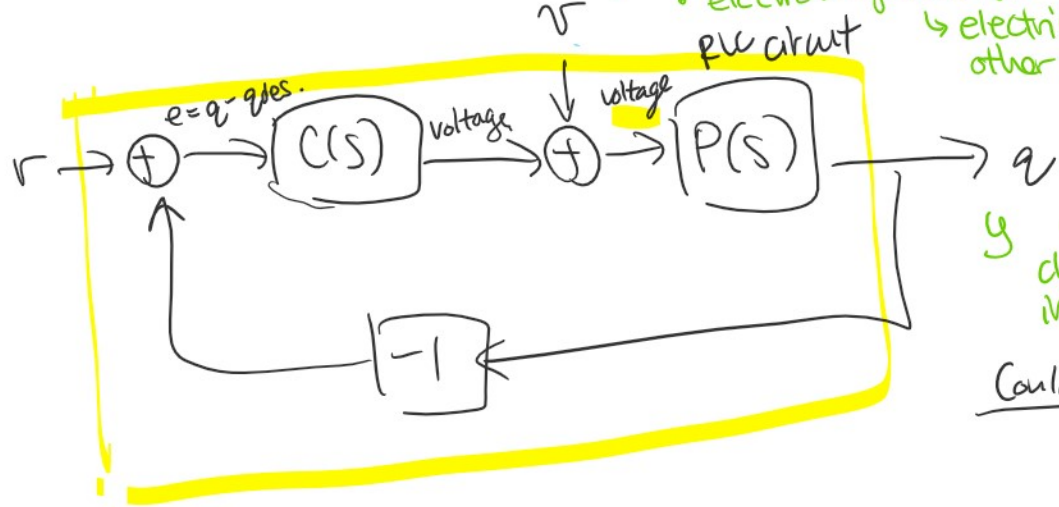
y amount of charge stored in capacitor.

Coulombs