Electronics Cheat Sheet

Jeremy Favro

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Revision 1

Miscellaneous

Time Constants

For capacitors $V_C = V_s\left[1 - e^{-\frac{t}{RC}}\right]$

$V_R = V_s e^{-\frac{t}{RC}}$

And for inductors $V_R = V_s\left[1 - e^{-\frac{tR}{L}}\right]$

$V_L = V_s e^{-\frac{tR}{L}}$

Thévenin

Solve circuit for voltage across port ($V_A - V_B$), solve for equivalent resistance by replacing batteries with wires and current sources with opens and trace a current path from A to B. Put the voltage source in **series** with the equivalent resistor.

Norton

Short the port and find the current through the port short. Find resistance using the same method as Thévenin. Put the current source in **parallel** (across the port) with the equivalent resistor.

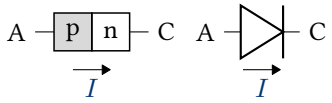
Differentials

$V_R = IR = R\frac{dQ}{dt}$

$V_L = L\frac{dI}{dt} = L\frac{d^2Q}{dt^2}$

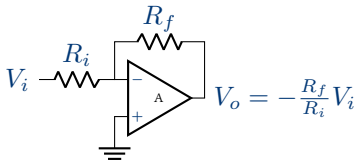
$V_C = \frac{Q}{C}$

Diode

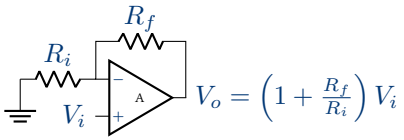


Op-Amps

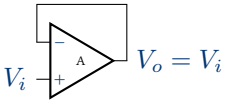
Inverting Amplifier



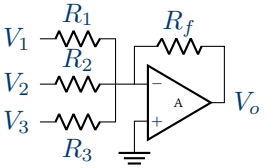
Non-Inverting Amplifier



Voltage Follower

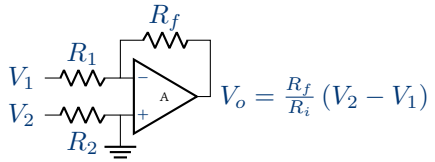


(Inverting) Adder

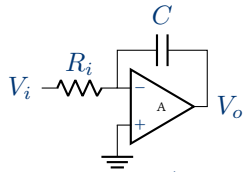


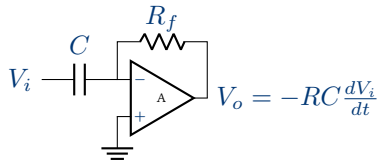
$V_o = -R_f\left(\frac{V_1}{R_1} + \frac{V_2}{R_2} + \frac{V_3}{R_3}\right)$

Subtractor



Integrator



$V_o = -\frac{1}{R_i C}\int_0^t V_i\,dt + V_o(t=0)$

Differentiator