Lecture 5B

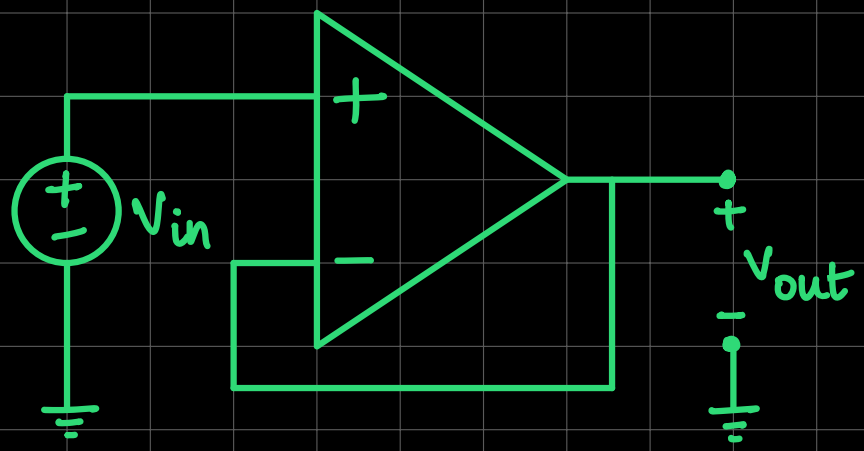
Agenda:

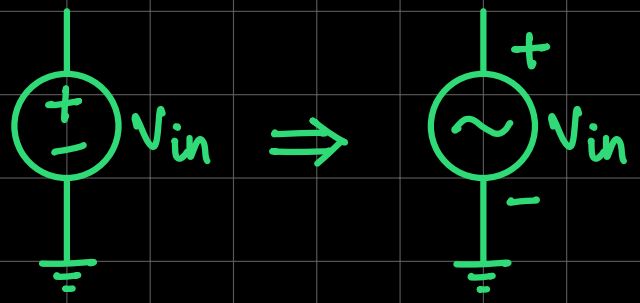
- → Op Amp Circuit Analysis
- → Inverting and Non-Inverting Amplifiers
- → Circuit Design (Intro)

Review

Golden Rules – ① ②

Buffer

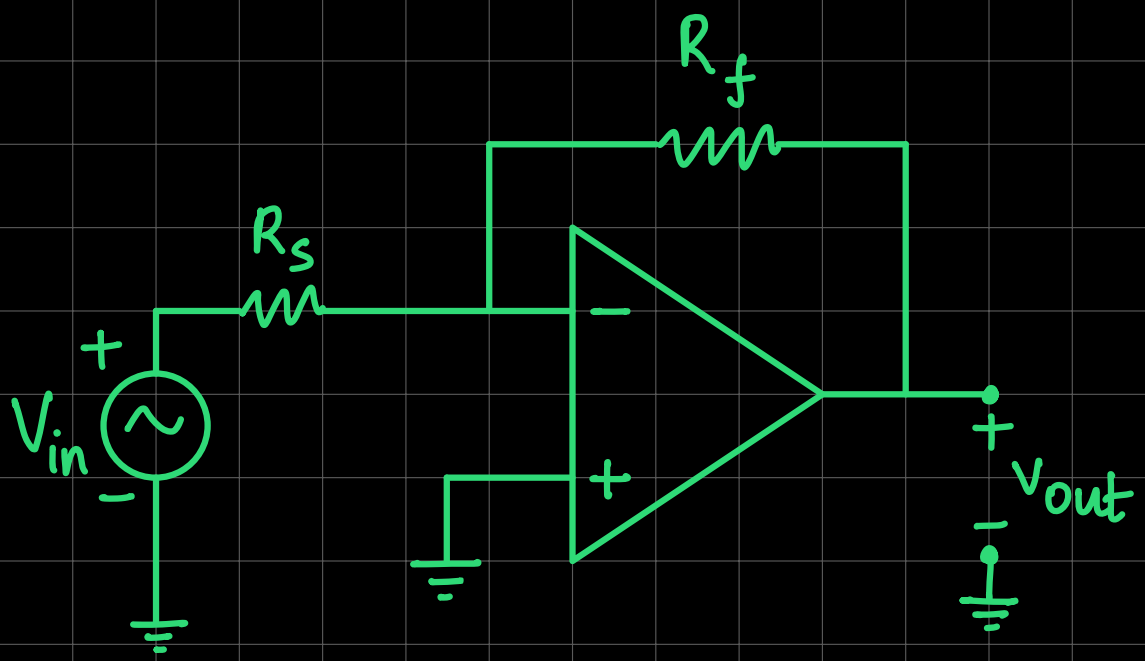




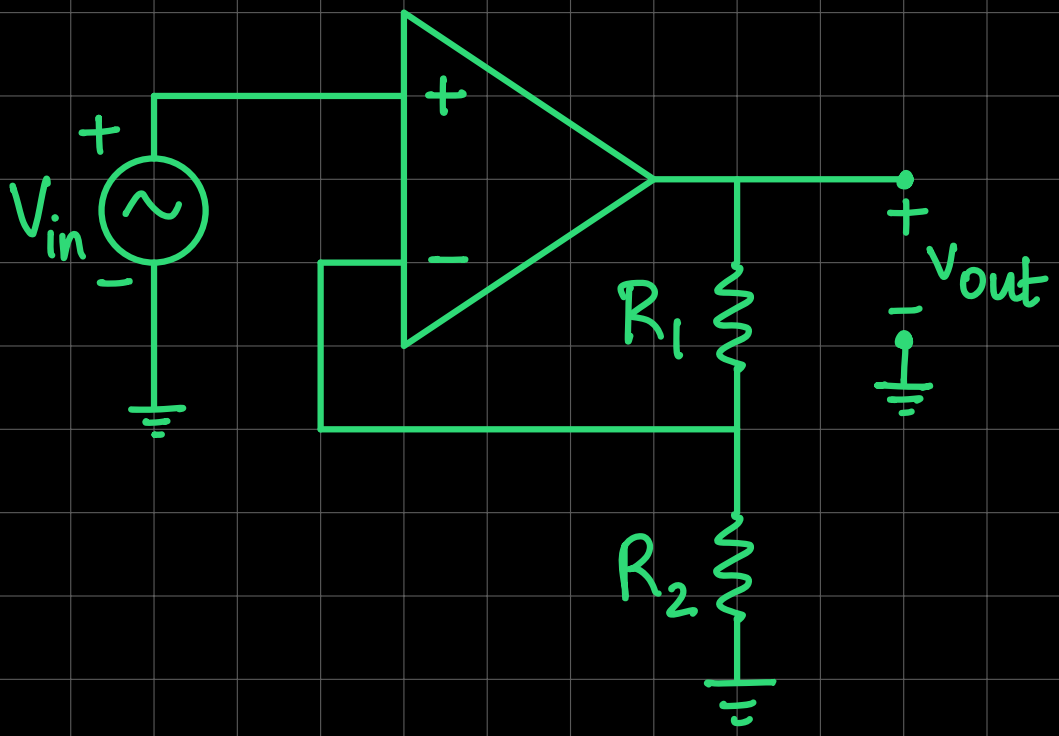
Voltage Source

Voltage Signal

Inverting Amplifier

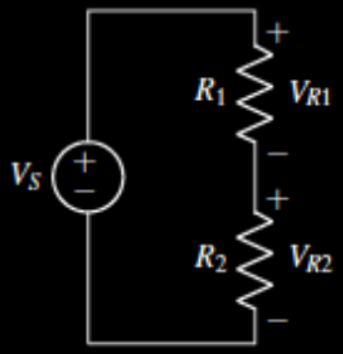


Non-Inverting Amplifier



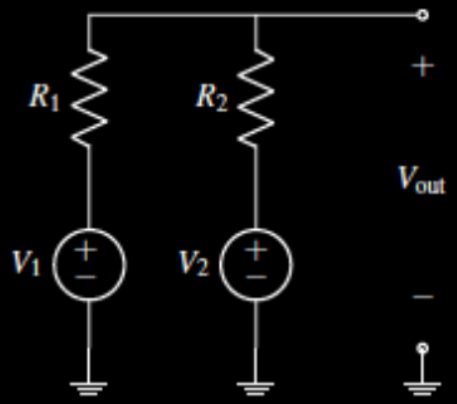
OP-AMP CHEAT SHEET

Voltage Divider



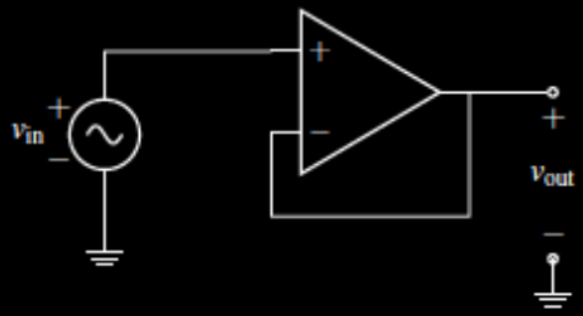
$$V_{R2} = V_S\left(\frac{R_2}{R_1+R_2}\right)$$

Voltage Summer



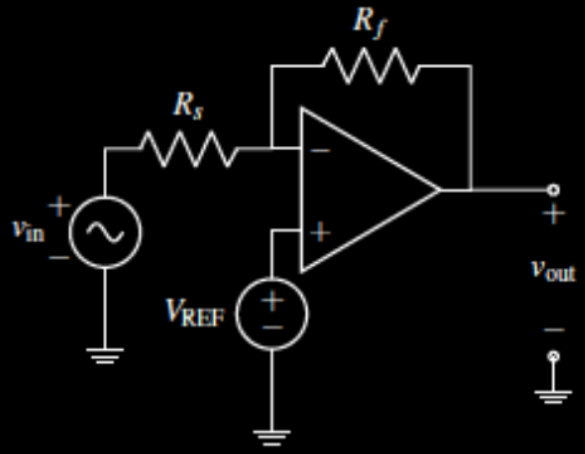
$$V_{out} = V_1\left(\frac{R_2}{R_1+R_2}\right) + V_2\left(\frac{R_1}{R_1+R_2}\right)$$

Unity Gain Buffer



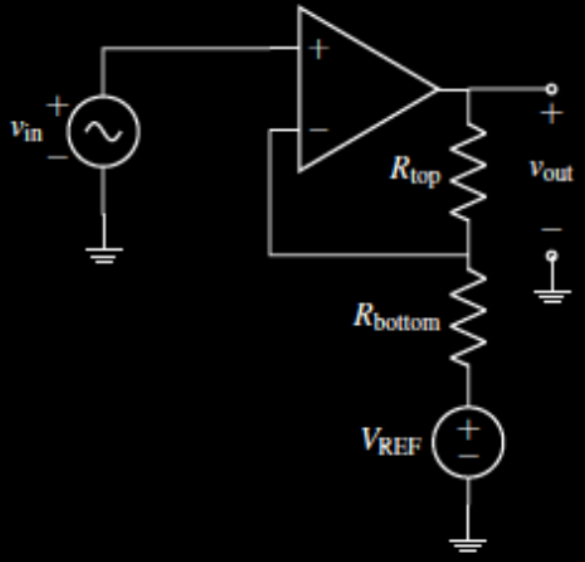
$$\frac{v_{out}}{v_{in}} = 1$$

Inverting Amplifier



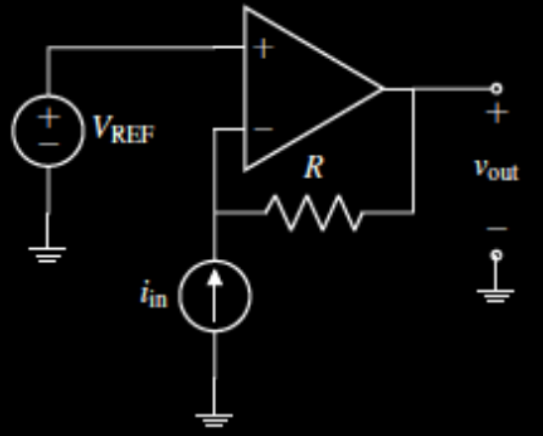
$$v_{out} = v_{in}\left(-\frac{R_f}{R_s}\right) + V_{REF}\left(\frac{R_f}{R_s}+1\right)$$

Non-inverting Amplifier



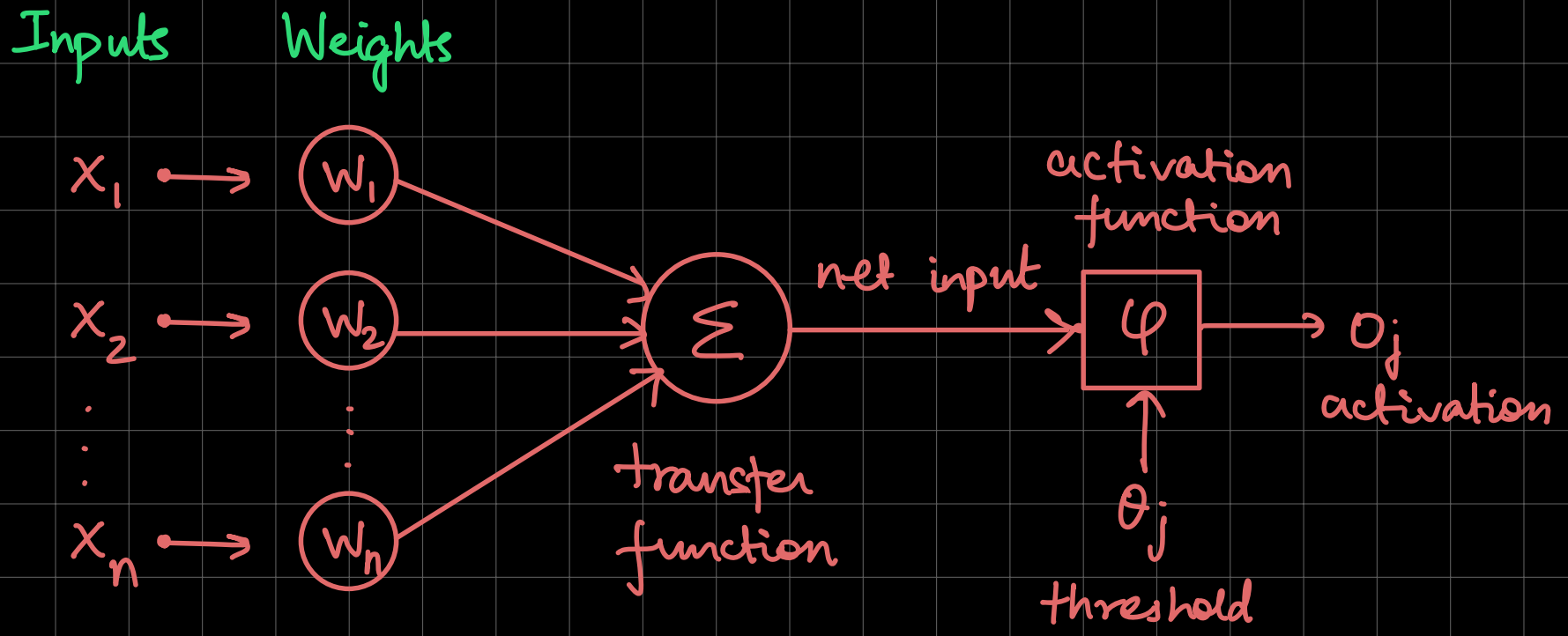
$$v_{out} = v_{in}\left(1+\frac{R_{top}}{R_{bottom}}\right) - V_{REF}\left(\frac{R_{top}}{R_{bottom}}\right)$$

Transresistance Amplifier

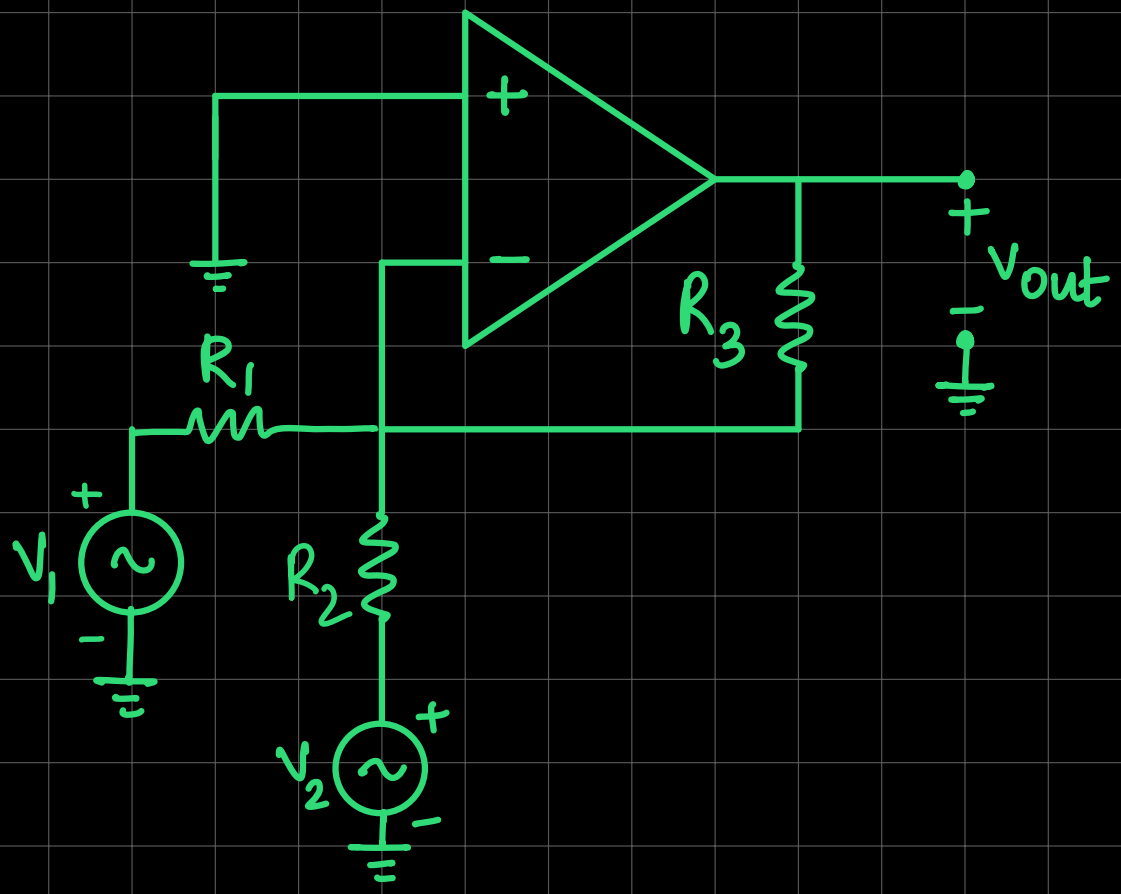


$$v_{out} = i_{in}(-R) + V_{REF}$$

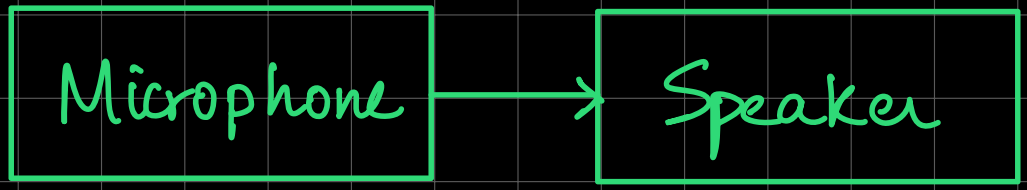
Artificial Neuron

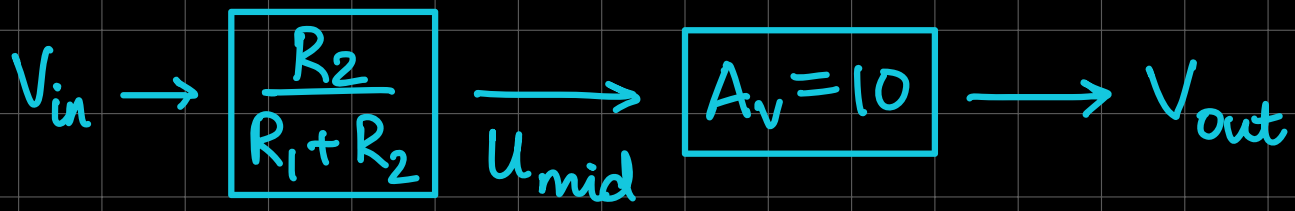


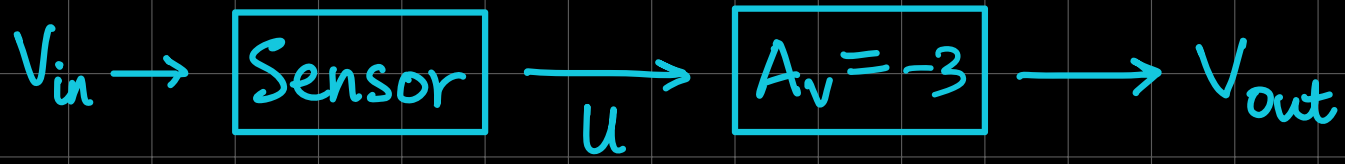
Artificial Neuron



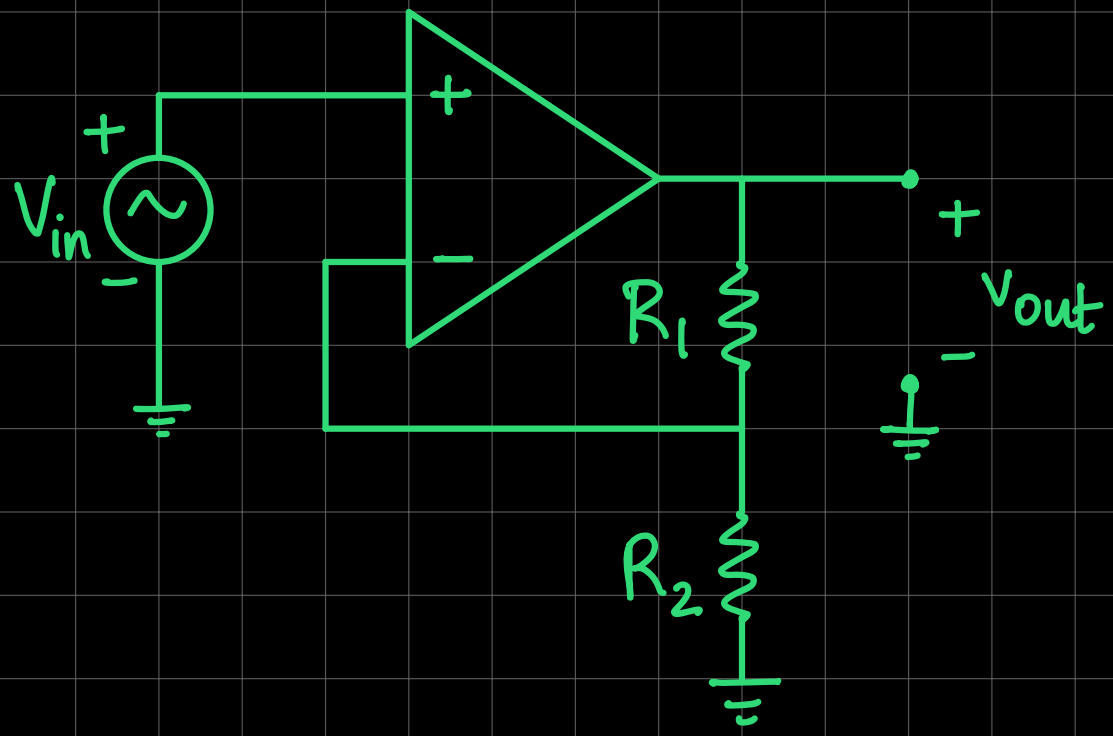
Loading and Cascading




V_{in}
$\frac{R_2}{R_1+R_2}$
U_{mid}
$A_V = 10$
V_{out}


V_{in}
Sensor
U
$A_v = -3$
V_{out}

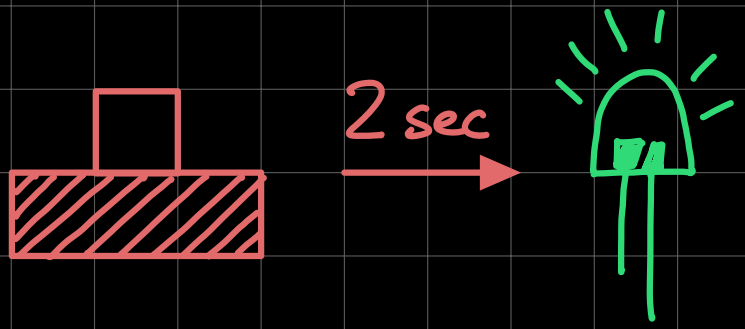
Loading and Cascading



Design

1. Specification - Restate your design goals
2. Strategy - Describe your strategy
3. Implementation - Implement components of your strategy
4. Verification - Check your design from Step 3

Countdown Timer



Objective →