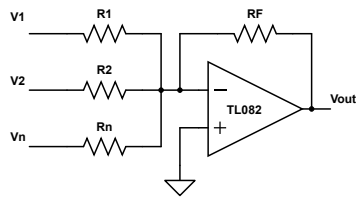
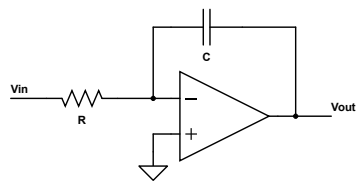


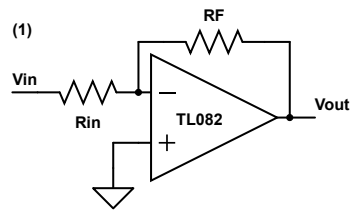
## OP-AMP CONFIGURATIONS



$$V_{out} = -\left(\frac{R_F}{R_1} \cdot V_1 + \frac{R_F}{R_2} \cdot V_2 \cdots + \frac{R_F}{R_n} \cdot V_n\right)$$

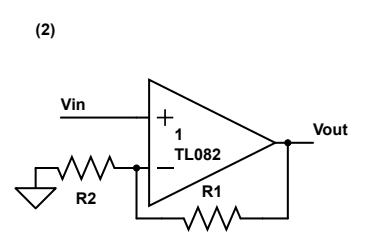


$$V_{out} = -\int_0^t \frac{V_{in}}{RC} dt + V_{initial} \quad \text{Integrator / Low-pass}$$



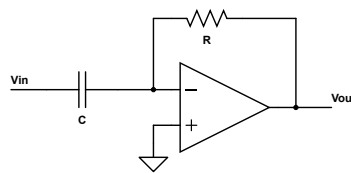
$$V_{out} = -\frac{R_F}{R_{in}} \cdot V_{in}$$

(1) Inverting



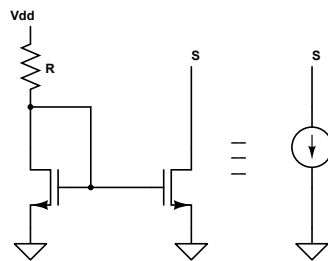
$$V_{out} = \left(1 + \frac{R_1}{R_2}\right) \cdot V_{in}$$

(2) Non-inverting

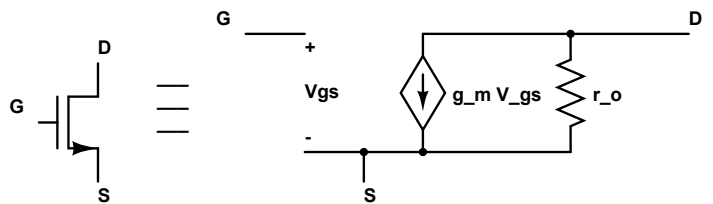


$$V_{out} = -RC \frac{dV_{in}}{dt} \quad \text{Differentiator / High-pass}$$

## MOSSFETS



Mosfet current mirror circuit



Mosfet current mirror circuit