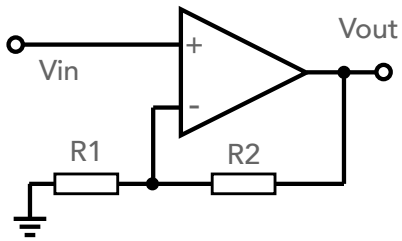
Common Operational Amplifier Circuits

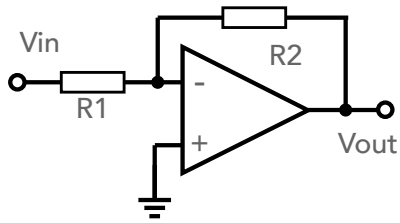
Operational amplifier chips provide an ideal building block for many circuit designs. I've put together a selection of some of the more commonly used circuits used for various electronic scenarios.

Non-inverting amplifier



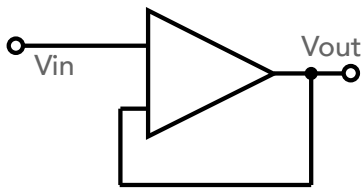
$$V_{out} = V_{in}\left(1 + \frac{R2}{R1}\right)$$

Inverting amplifier



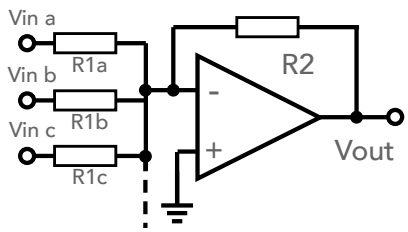
$$V_{out} = V_{in}\ \frac{R2}{R1}$$

Voltage Follower



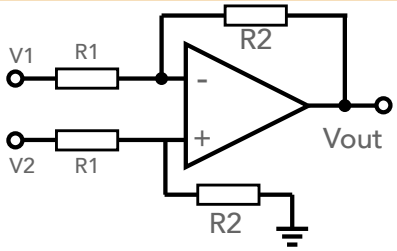
$$V_{out} = V_{in}$$

Summing amplifier



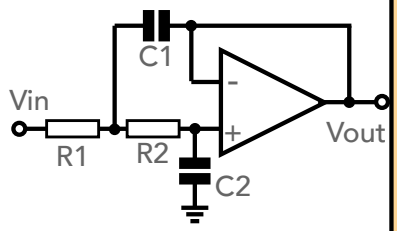
$$V_{out} = V_{in}\ \frac{R2}{R1_{(x)}}$$

Difference amplifier



$$V_{out} = \frac{R2}{R1}\ (V2 - V1)$$

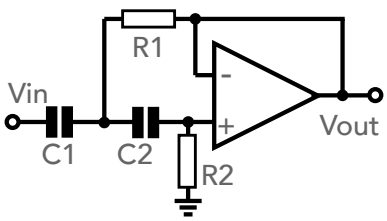
Low Pass Filter



$R1 = R2 \qquad f = \frac{\sqrt{2}}{4\ \pi\ R\ C2}$

$C1 = 2C2$

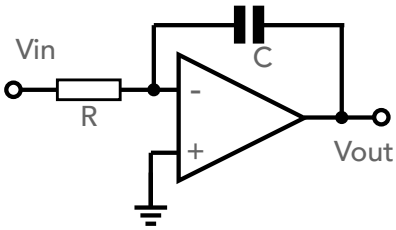
High Pass Filter



$R1 = R2 \qquad f = \frac{\sqrt{2}}{4\ \pi\ R\ C2}$

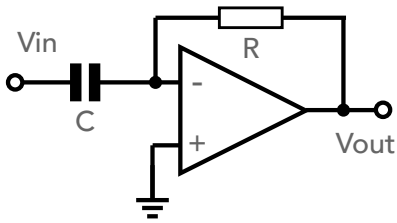
$C1 = 2C2$

Integrator



$$V_{out} = -\int_0^t \frac{V_{in}}{R\ C}\ dt\ + c$$

Differentiator



$$V_{out} = -\ R\ C\ \frac{dV_{in}}{dt}$$