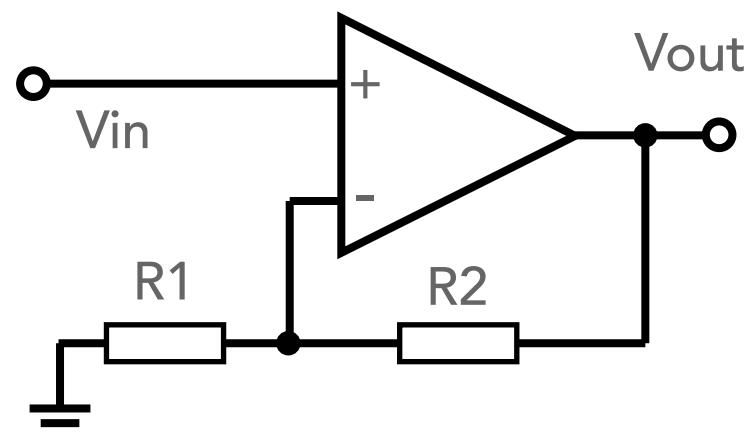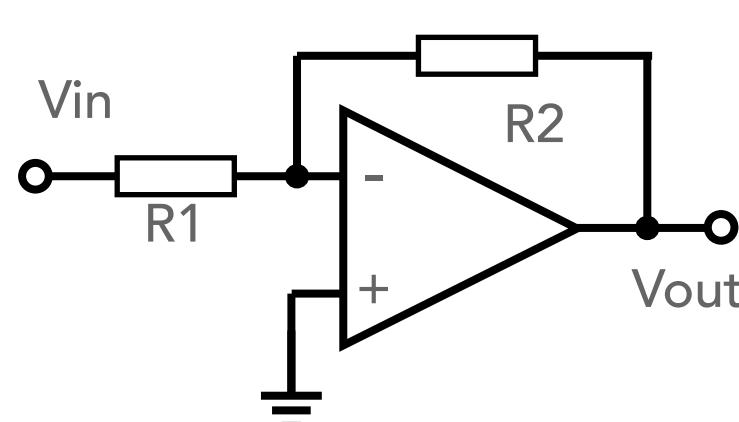# Common Operational Amplifier Circuits

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.
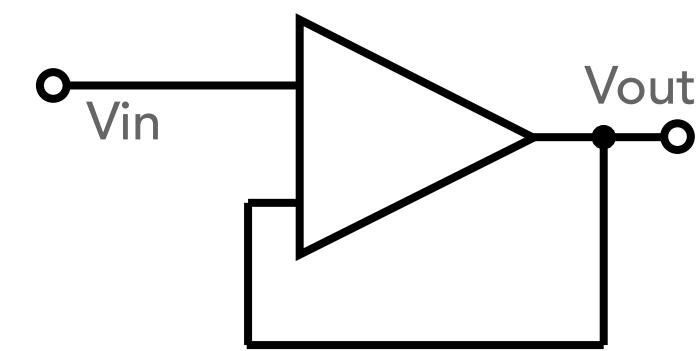
### Non-inverting amplifier



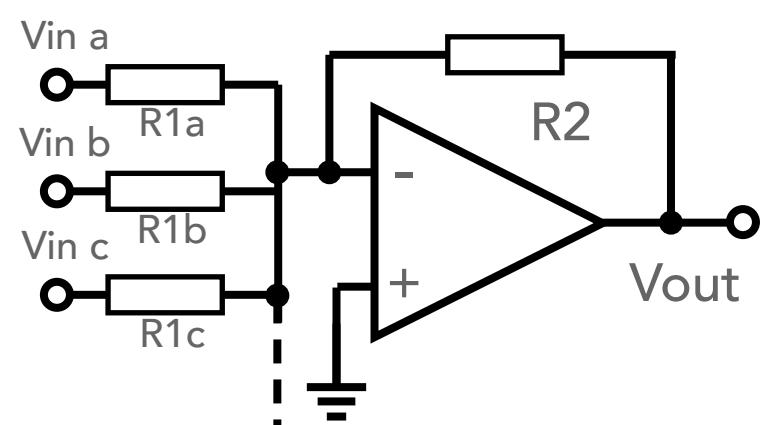$$Vout = Vin\left(1 + \frac{R2}{R1}\right)$$

### Inverting amplifier



$$Vout = -Vin\,\frac{R2}{R1}$$

### Voltage Follower
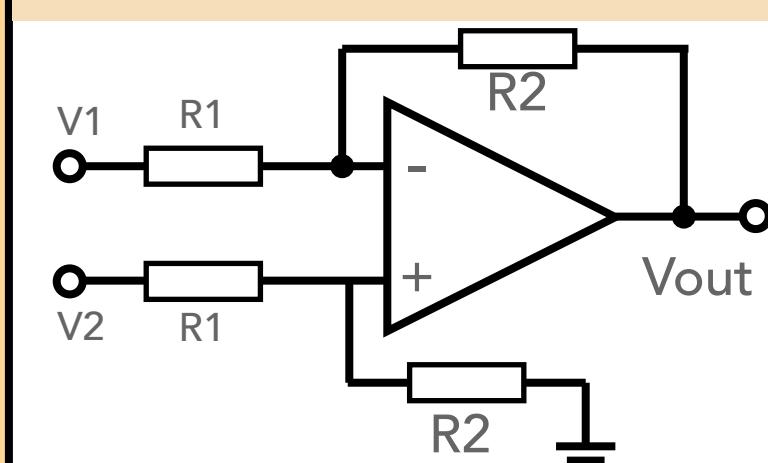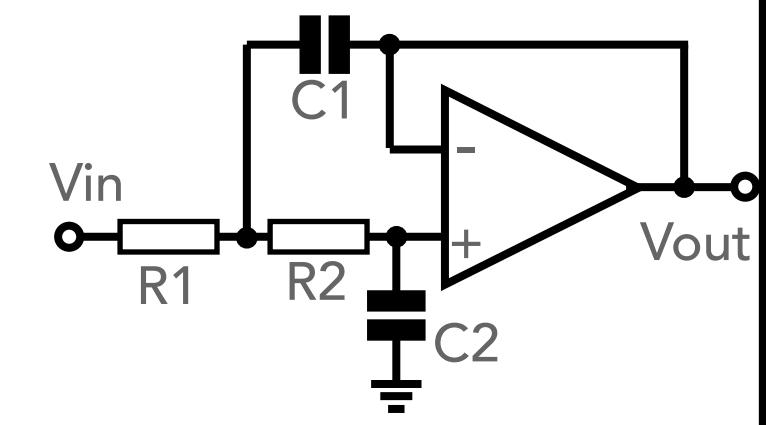


$$Vout = Vin$$

### Summing amplifier



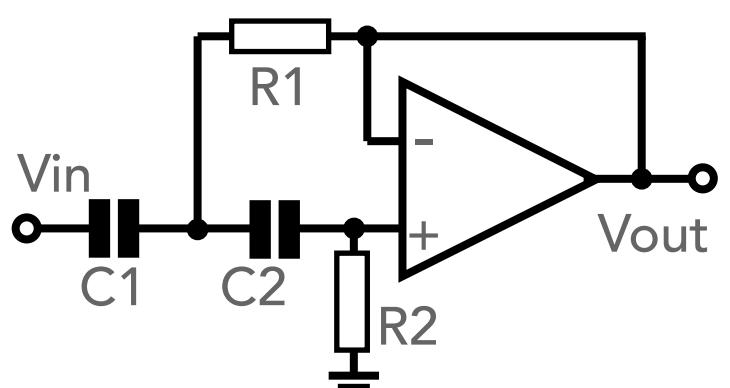$$Vout = Vin\,\frac{R2}{R1_{(x)}}$$

### Difference amplifier
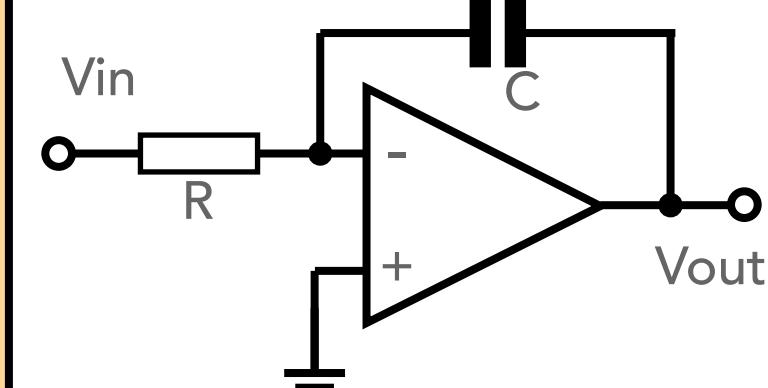


$$Vout = \frac{R2}{R1}\,(V2 - V1)$$

### 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



$$Vout = -\int_{0}^{t}\frac{Vin}{R\,C}\,dt + c$$

### Differentiator



$$Vout = -R\,C\,\frac{dVin}{dt}$$