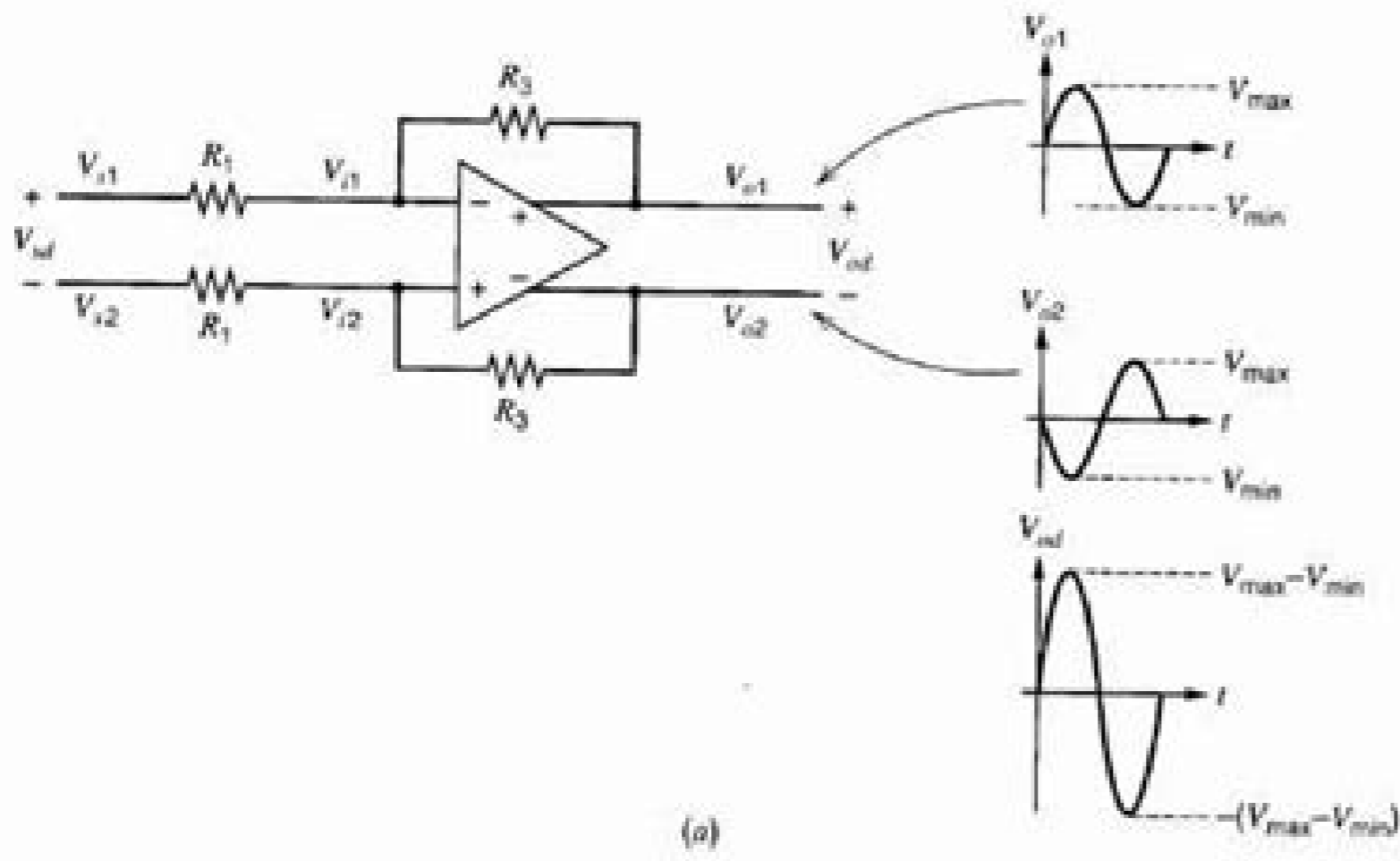
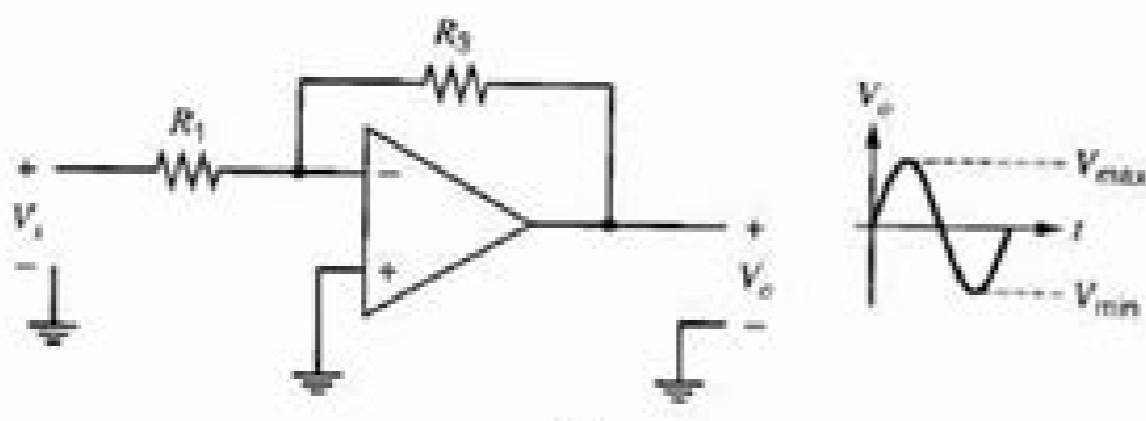


I'm not robot!



(a)



(b)

Figure 12.1. (a) Fully differential and (b) single-ended inverting amplifiers.

This larger output swing can result in a higher signal-to-noise ratio. Ignoring the noise from the op amp and from the feedback resistor R_3 , we see that thermal noise associated with the R_1 input resistors is the only source of noise. In the single-ended circuit in Fig. 12.1b, the output noise power due to resistor R_1 is

$$\overline{v_{oN}^2(s.e.)} = \left(1 + \frac{R_3}{R_1}\right)^2 4kTR_1(BW_N) \quad (12.1)$$

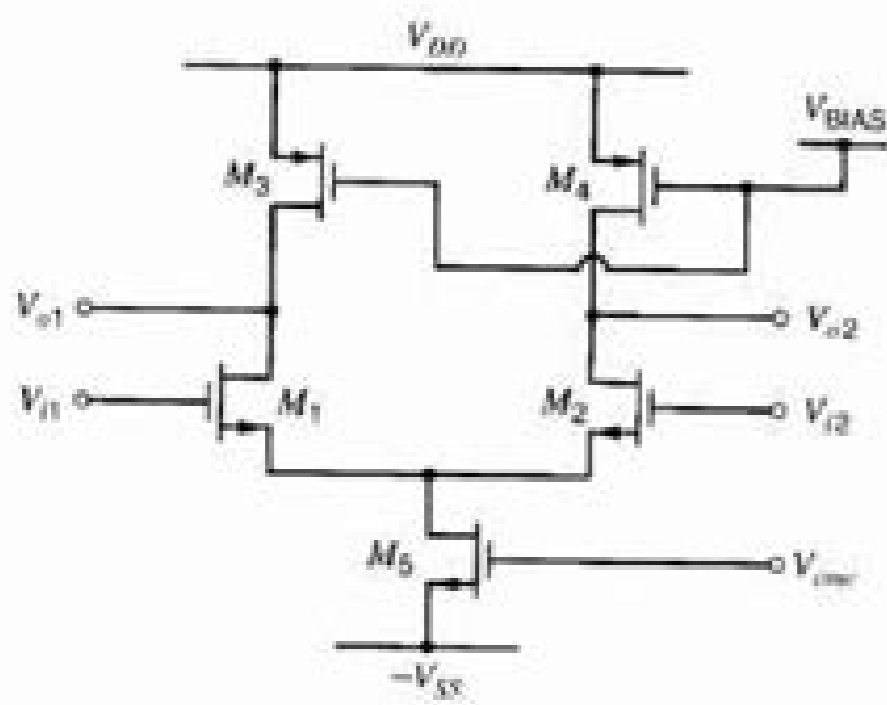
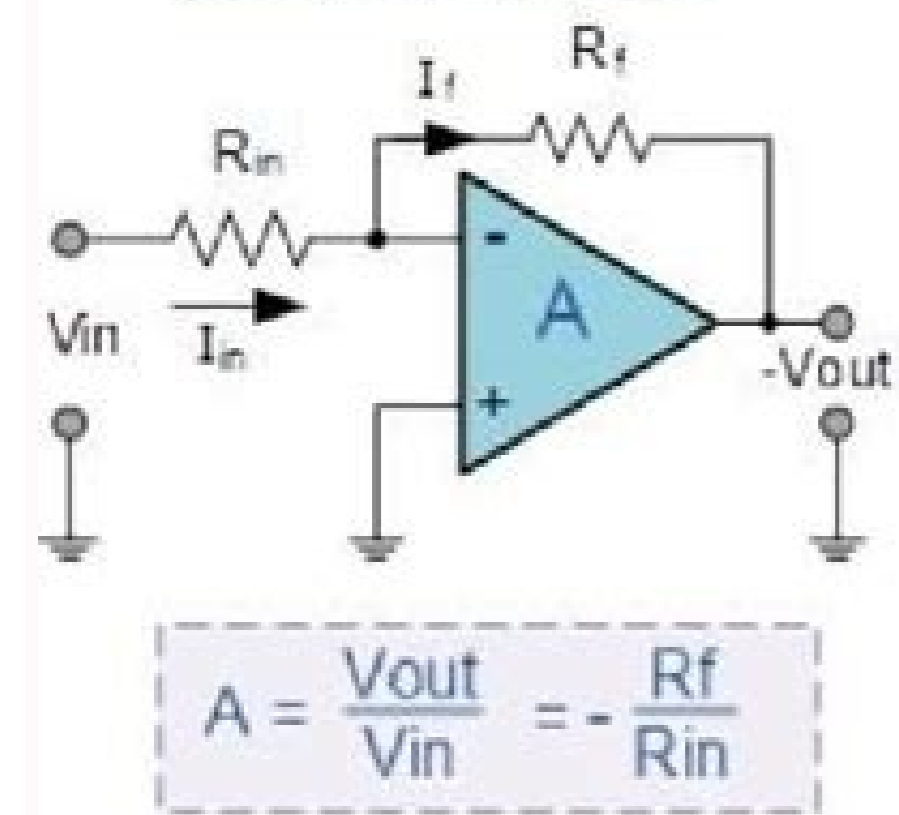


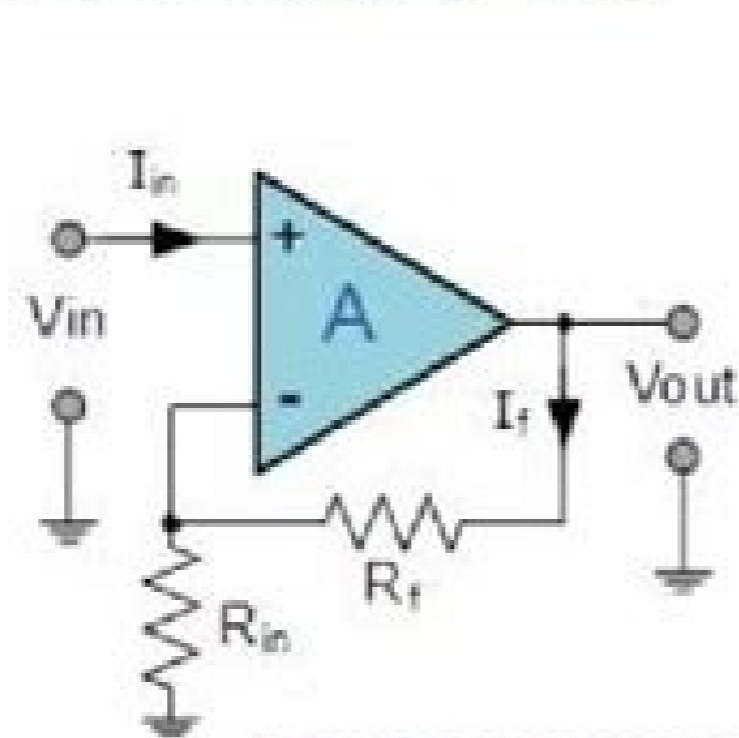
Figure 12.2. A simple, one-stage, fully differential op amp.

Inverting Op-amp

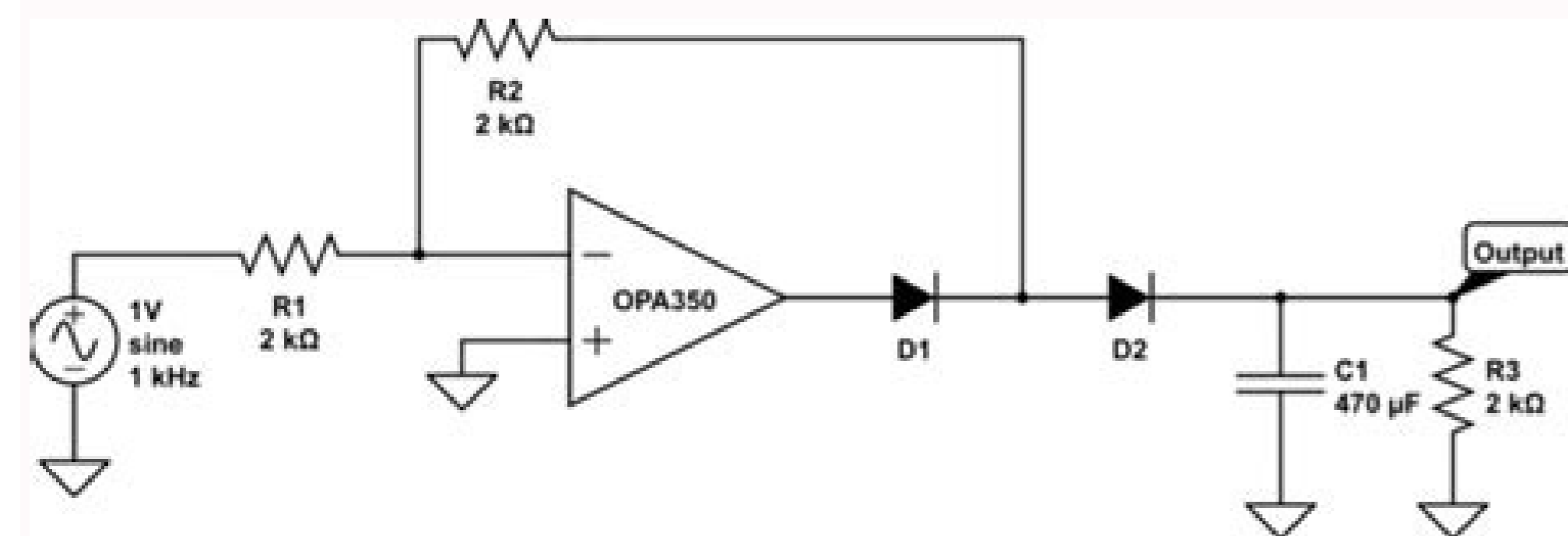


$$A = \frac{V_{out}}{V_{in}} = -\frac{R_f}{R_{in}}$$

Non-inverting Op-amp



$$A = \frac{V_{out}}{V_{in}} = 1 + \frac{R_f}{R_{in}}$$



2002), "IC Op-Amps Through the Ages" (PDF), Stanford University, from the original on October 24, 2012Handout #18: EE214 Fall 2002.{{cite web}}: CS1 maint: postscript (link) ^ Lu, Liang-Hung. (PDF), National Taiwan University, Graduate Institute of Electronics Engineering, Archived from the original (PDF) on 2014-06-30. Retrieved 2014-02-22. ^ "Understanding silicon circuits: inside the ubiquitous 741 op amp", www.righto.com. Archived from the original on 9 October 2017. Retrieved 28 April 2018. ^ The iA741 Operational Amplifier[permanent dead link] ^ An input bias current of 1 μA through a DC source resistance of 10 kΩ produces a 10 mV offset voltage. If the other input bias current is the same and sees the same source resistance, then the two input offset voltages will cancel out. Balancing the DC source resistances may not be necessary if the input bias current and source resistance product is small. ^ Analog Devices (2009). "Op Amp Input Bias Current" (PDF). Analog Devices. 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