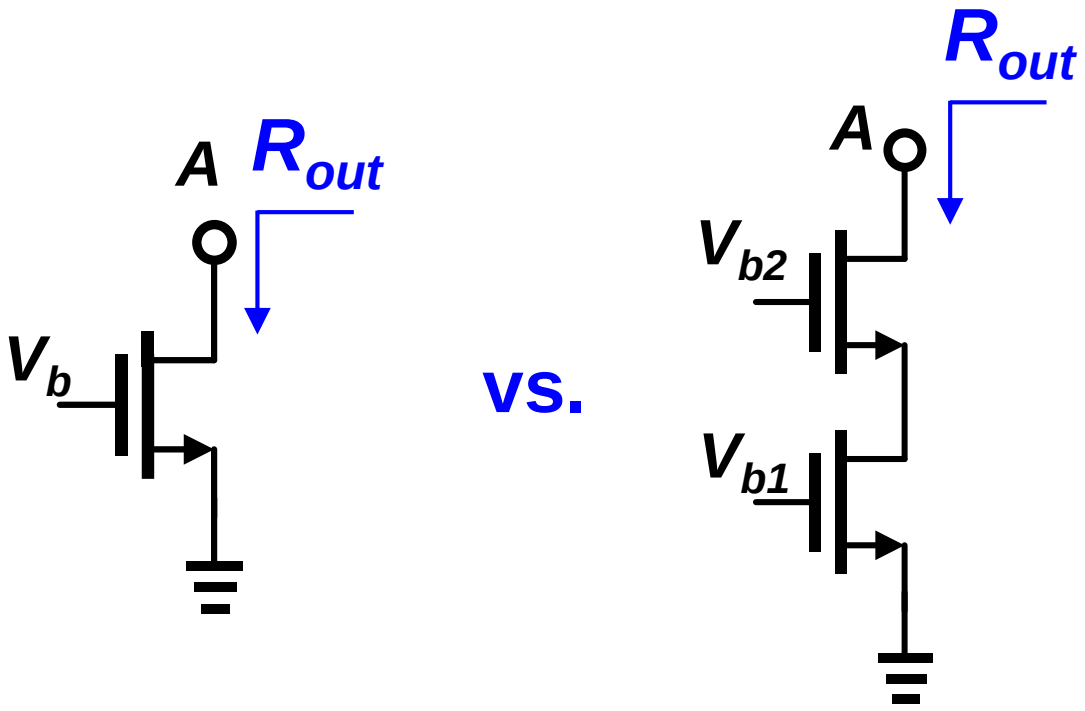
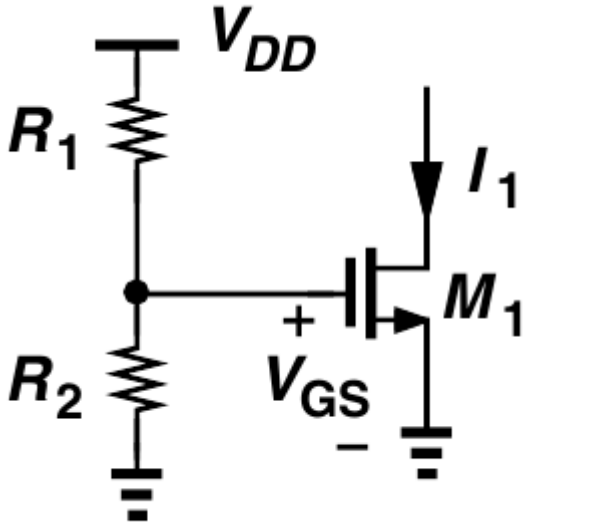
Revisit Current Source

- How do you generate V_b, V_{b2} or V_{b1}?



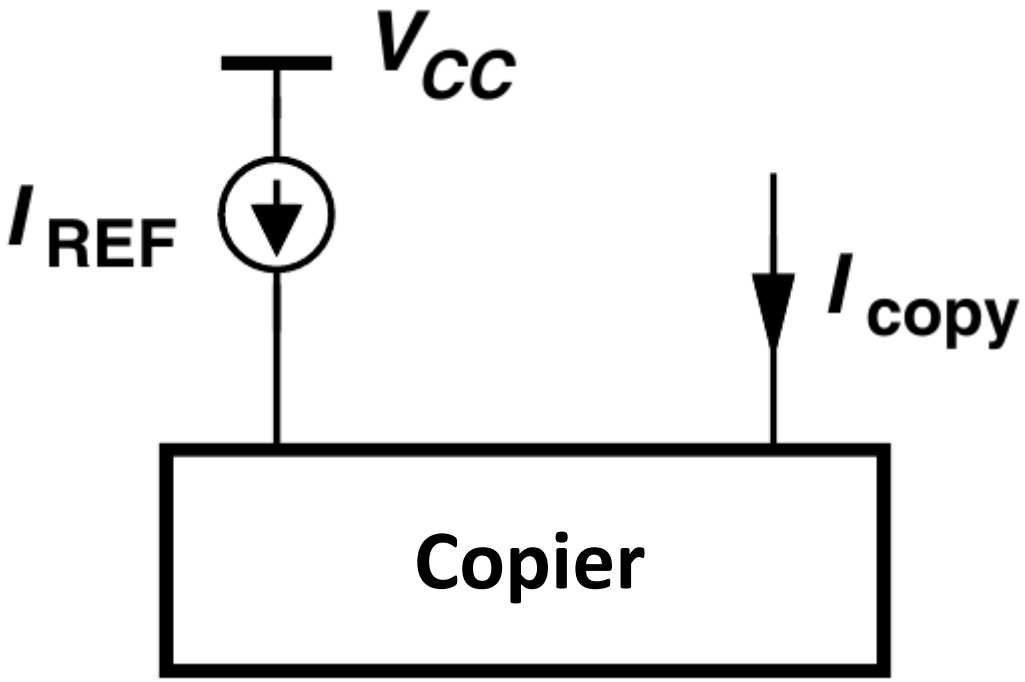
Of Course,

- You mean it?



We Can Copy Golden Current

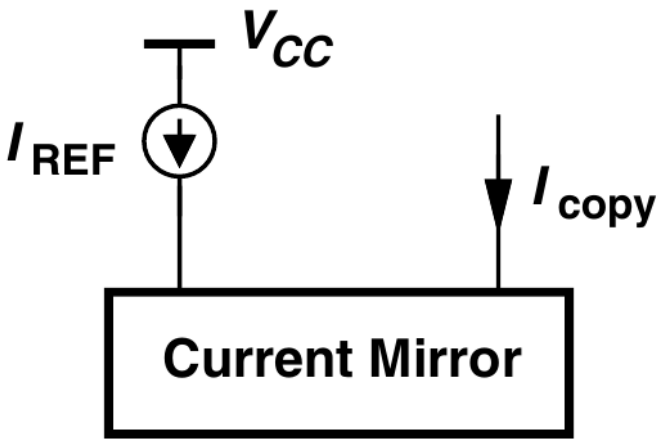
- Bandgap reference circuit can generate current robustly.

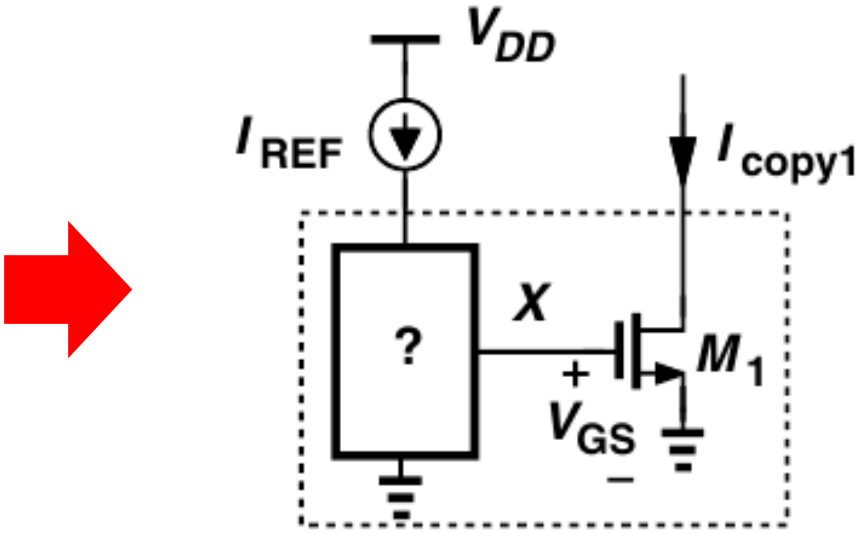


Current Mirror

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Let's Specify a Little Bit

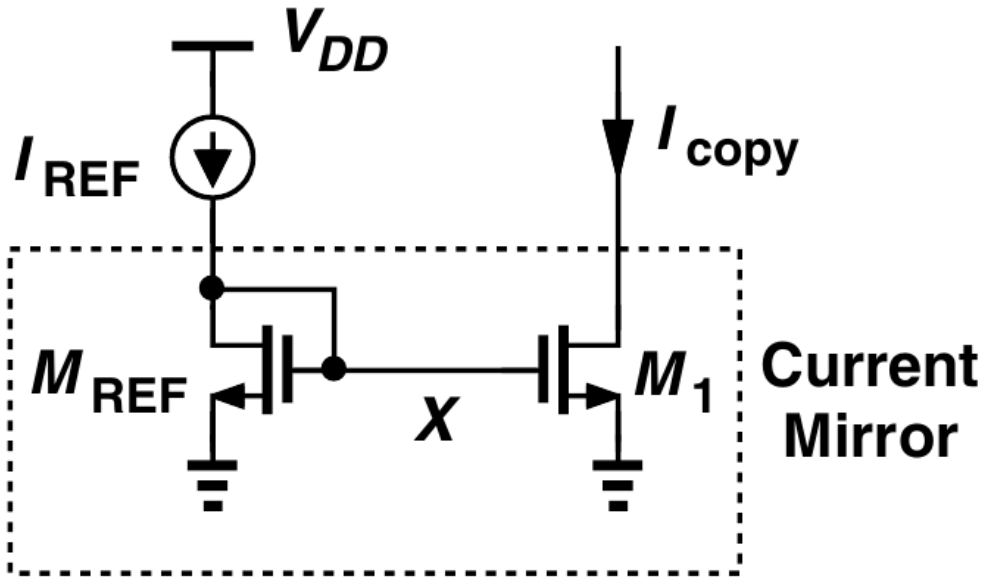




$$\frac{1}{2}\mu_n C_{ox}\left(\frac{W}{L}\right)_1 (V_X - V_{TH1})^2 = I_{copy1}$$

$$\frac{1}{2}\mu_n C_{ox}\left(\frac{W}{L}\right)_1 (V_X - V_{TH1})^2 = I_{REF}$$

Current Mirror Characteristic



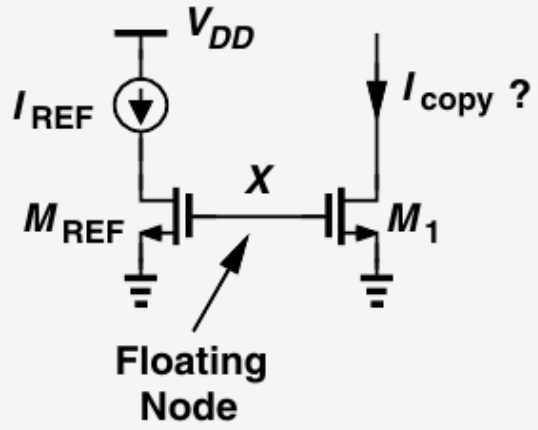
$$I_{D,REF} = \frac{1}{2}\mu_n C_{ox}\left(\frac{W}{L}\right)_{REF}(V_X - V_{TH})^2$$

$$I_{copy} = \frac{1}{2}\mu_n C_{ox}\left(\frac{W}{L}\right)_1(V_X - V_{TH})^2,$$

$$I_{copy} = \frac{\left(\frac{W}{L}\right)_1}{\left(\frac{W}{L}\right)_{REF}} I_{REF},$$

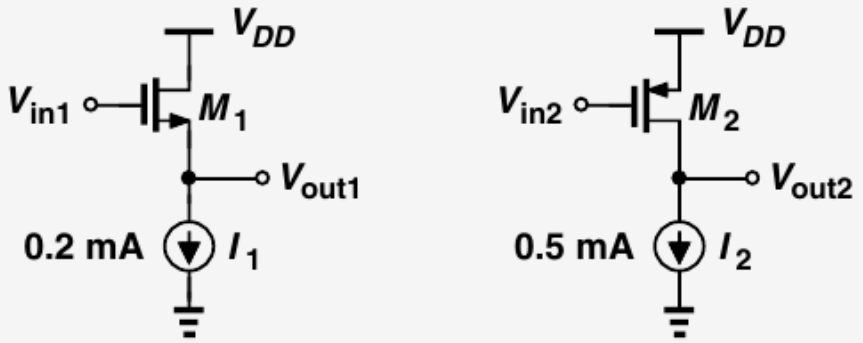
Example 9.20

The student working on the circuits in Examples 9.12 and 9.13 decides to try the MOS counterpart, thinking that the gate current is zero and hence leaving the gates floating (Fig. 9.36). Explain what happens.



Example 9.21

An integrated circuit employs the source follower and the common-source stage shown in Fig. 9.37(a). Design a current mirror that produces I_1 and I_2 from a 0.3-mA reference.



(a)