UESTC 3003: Electronic System Design
Static Errors

Lecture 2.4: Bias Current Blues(2)

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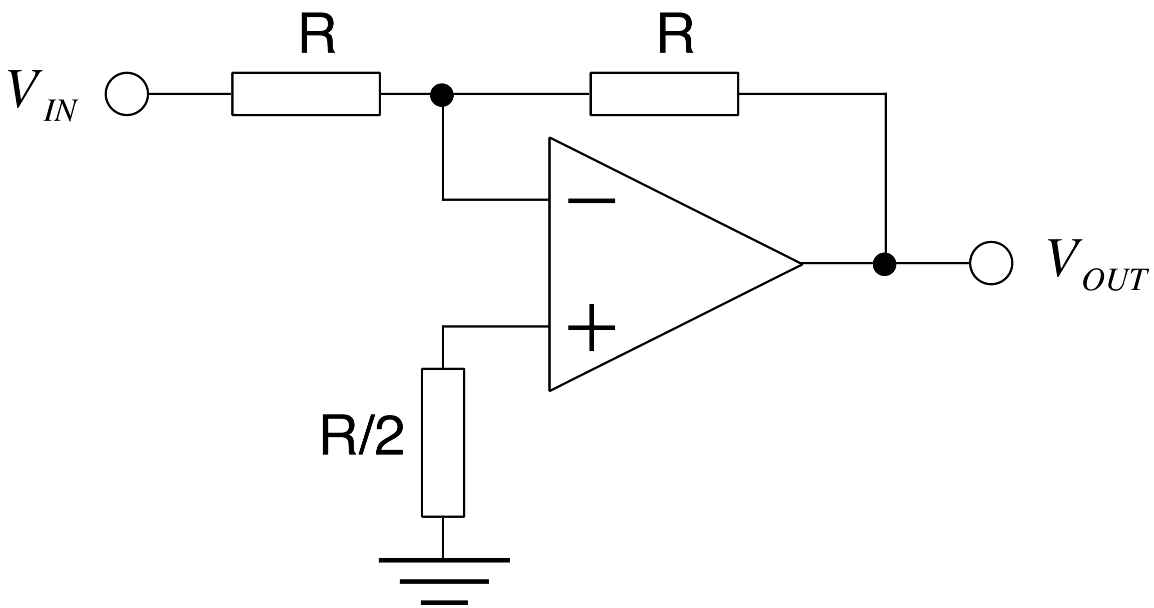
WORLD CHANGING GLASGOW

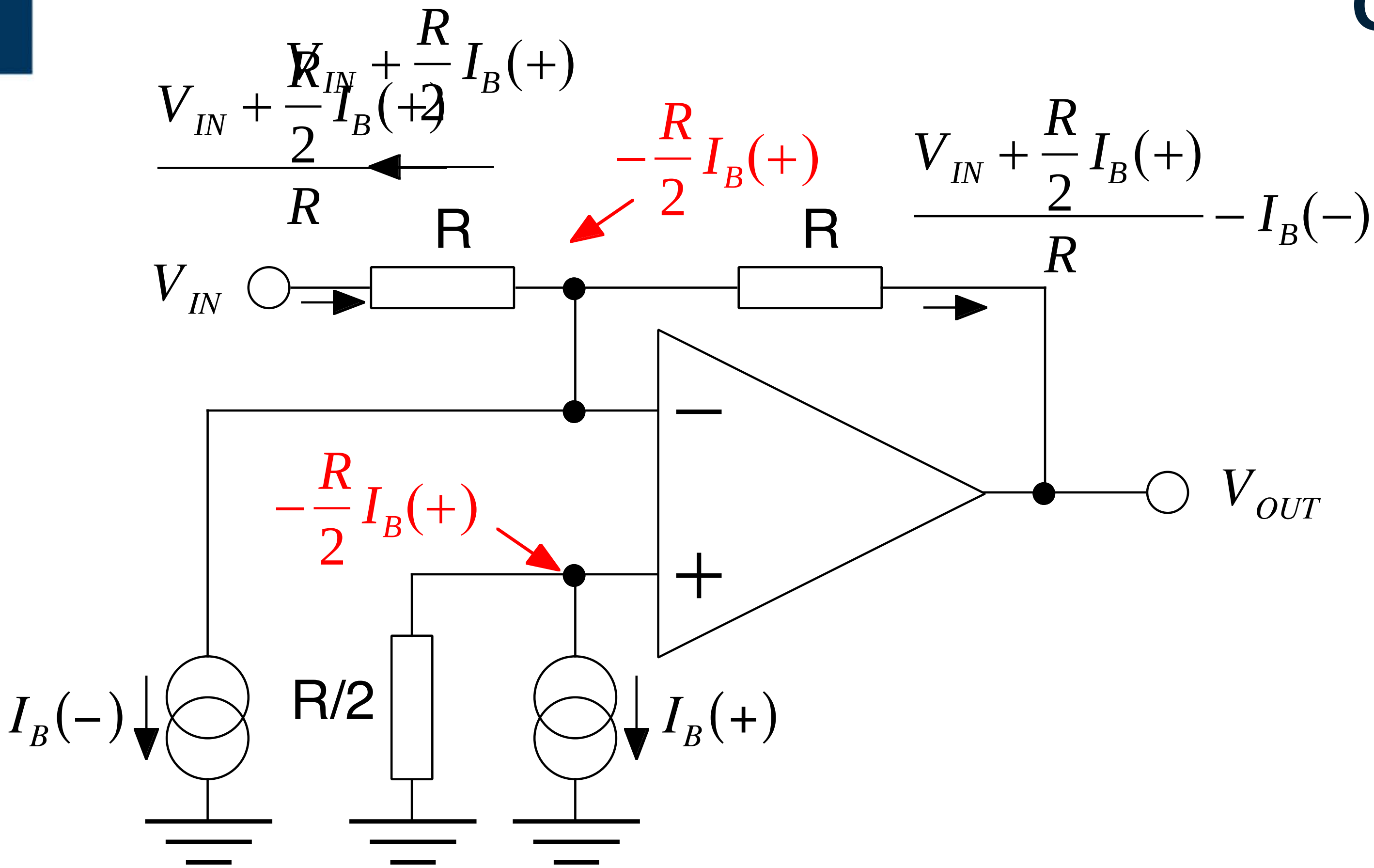
A Cool Fix (If currents are Equal)



Make DC resistances equal at both inputs

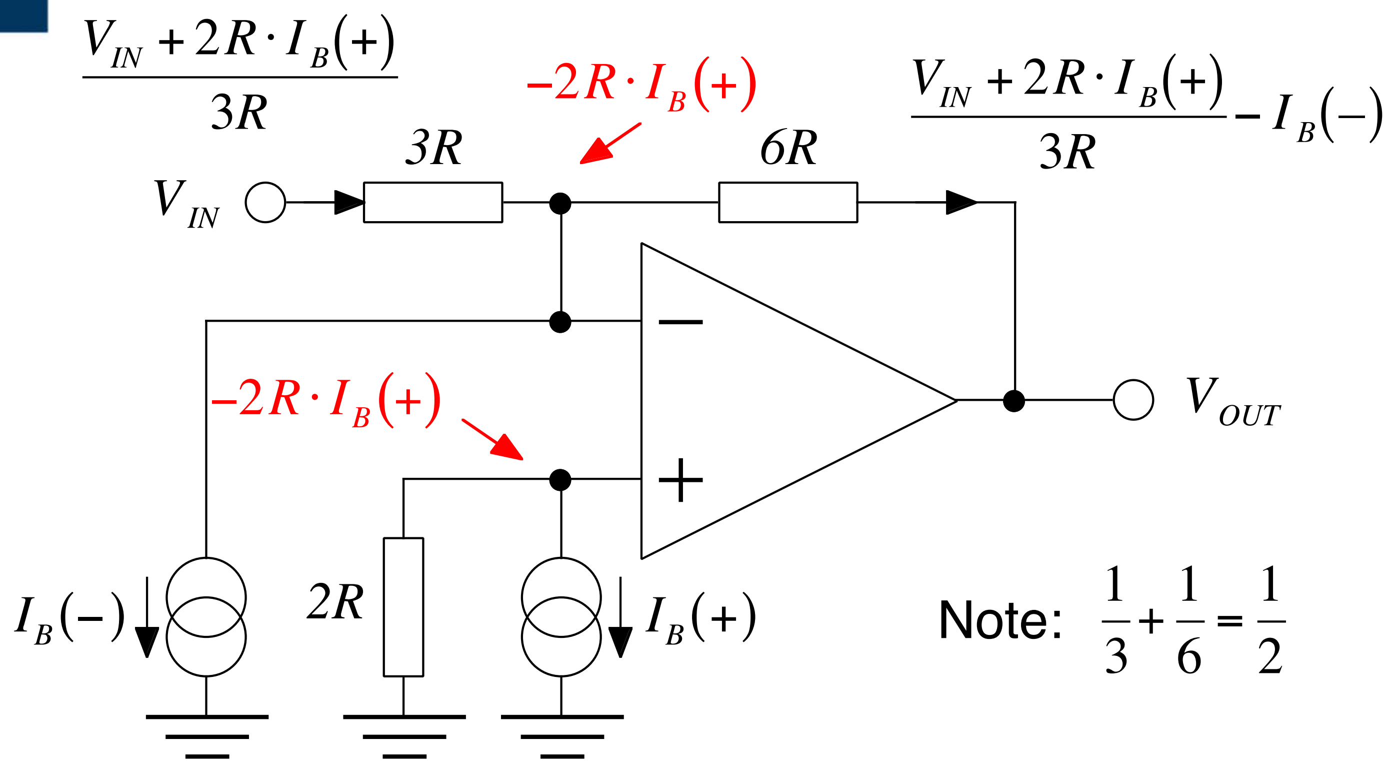
(NOTE: Take care if there are inductors or capacitors about!)

Compensating for Equal Bias Currents



$$V_{OUT} = -\frac{R}{2} I_B(+) - V_{IN} - \frac{R}{2} I_B(+) + R I_B(-) \quad = -V_{IN} + R\big(I_B(-) - I_B(+)\big)$$

Equal Bias Currents and Gain



Note: $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$

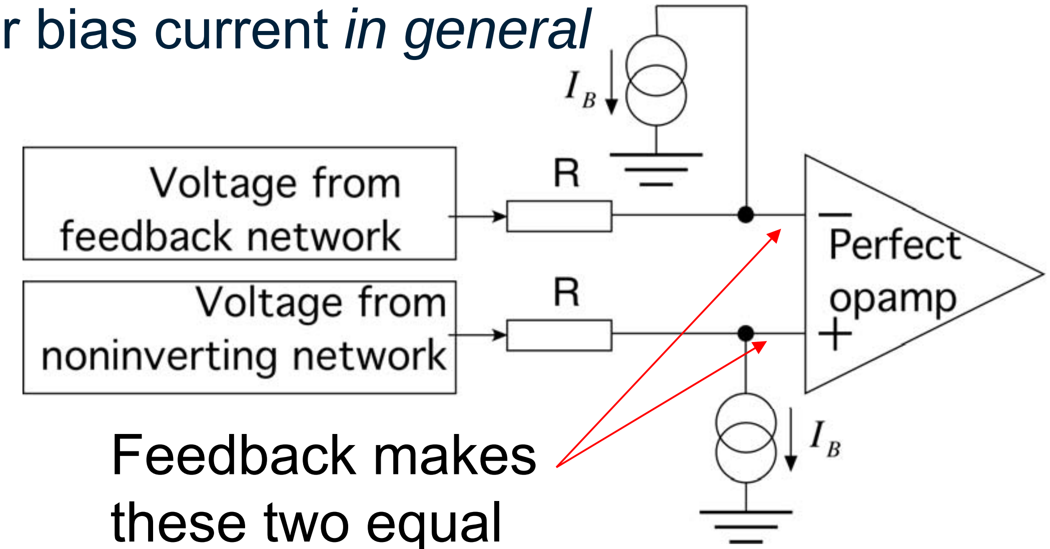
$$V_{OUT} = -2R \cdot I_B(+) - \frac{6RV_{IN}}{3R} - \frac{6R \cdot 2R \cdot I_B(+)}{3R} + 6R \cdot I_B(-)$$

$$= -2V_{IN} - 6R \cdot I_B(+) + 6R \cdot I_B(-) = -2V_{IN} + 6R\left(I_B(-) - I_B(+)\right)$$

Equal Bias Currents

Equal source impedances compensate
for bias current *in general*

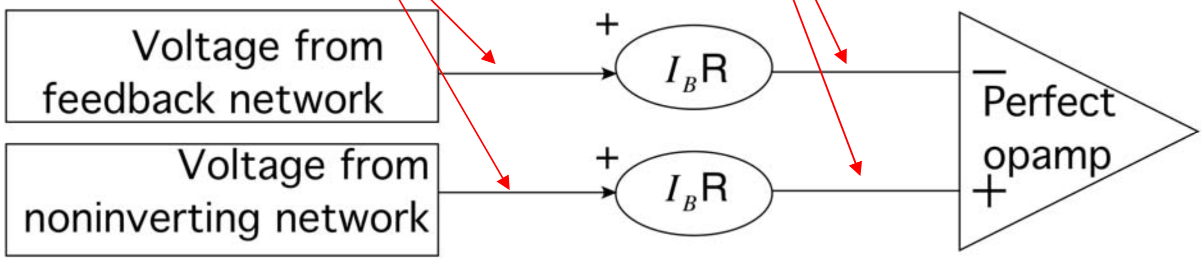
R is the Thevenin Equivalent source resistance of the associated network



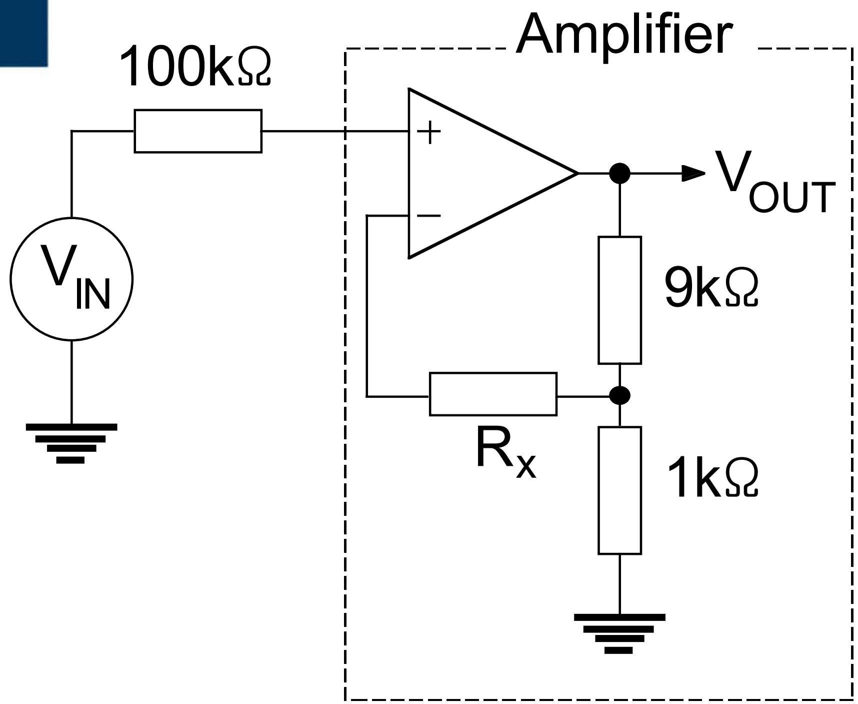
Feedback makes these two equal

So Voltage from FB network
Still equals the voltage from
the noninverting network

Is equivalent to



Noninverting



What is the required Value of R_x?

Need $1k \,//\, 9k + R_x = 100k\Omega$ $\qquad$ $R_x = 100k\Omega - 0.9k\Omega = 99.1k\Omega$

Exercise: Show that this works! [Use Ib(+) = Ib(-) = 150nA]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Thank you
谢谢
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