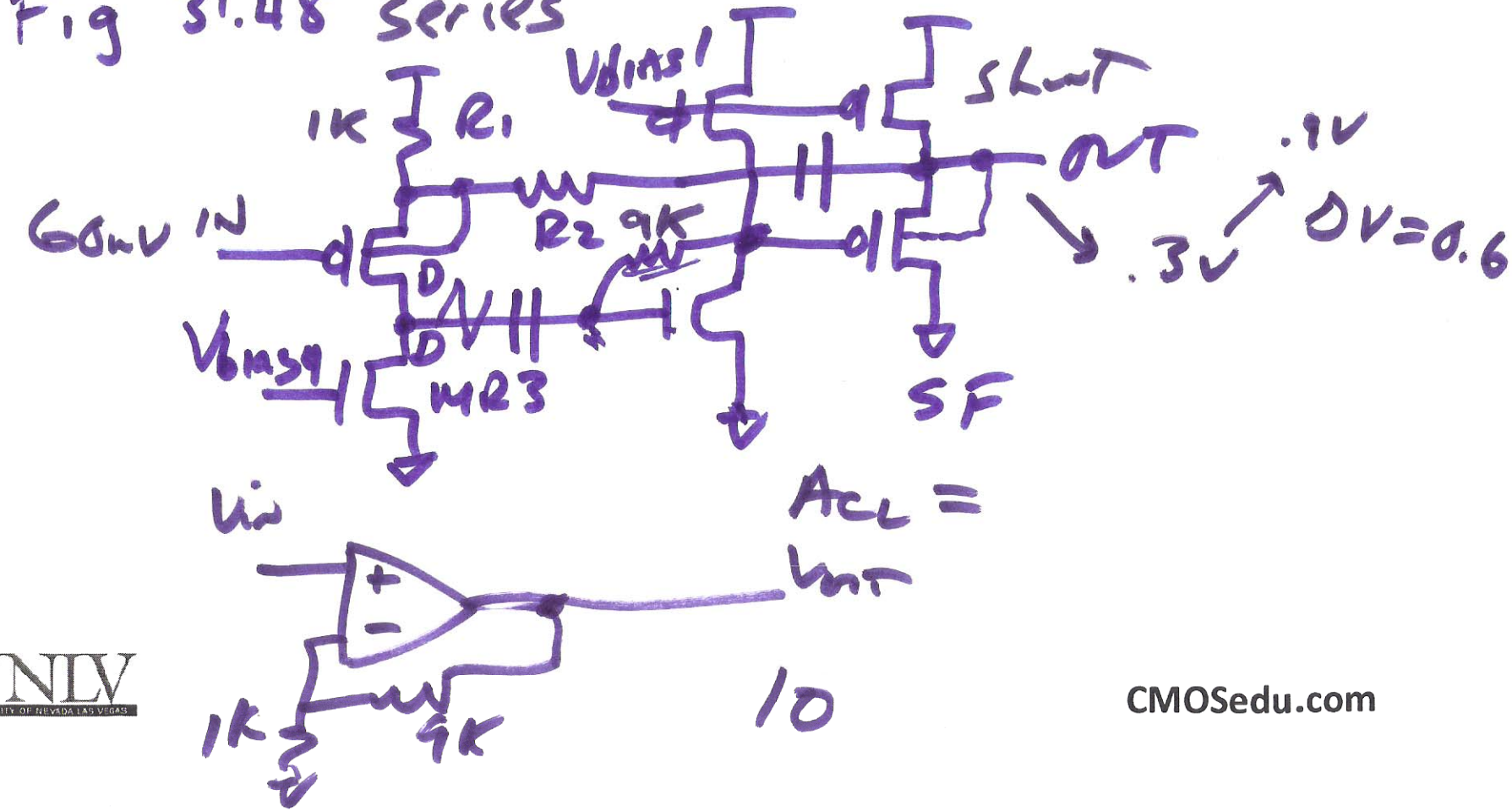
EC-720 Advanced Analog IC Design

OCT. 7, 2013

Lecture 12

Fig 31.48 series



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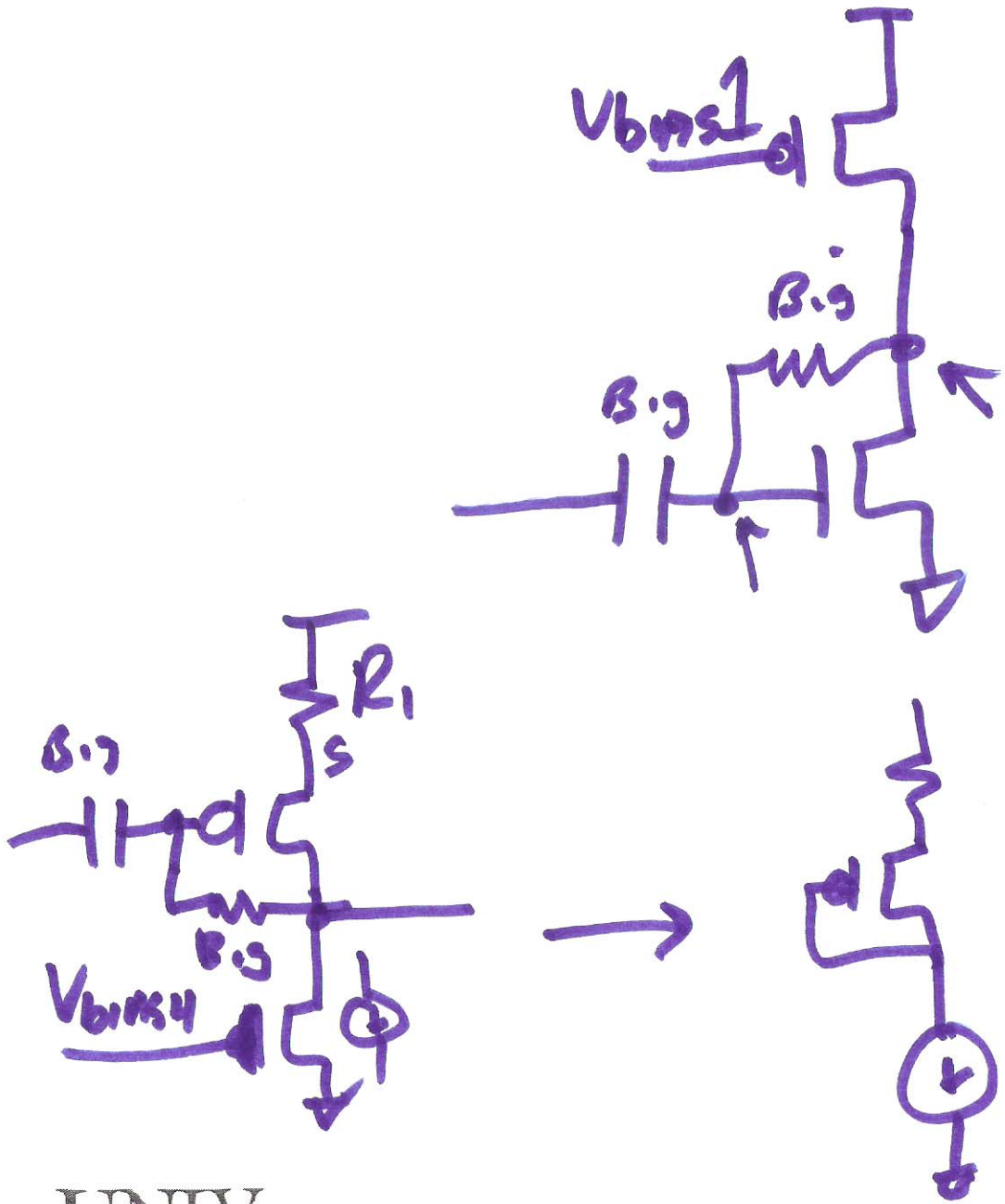

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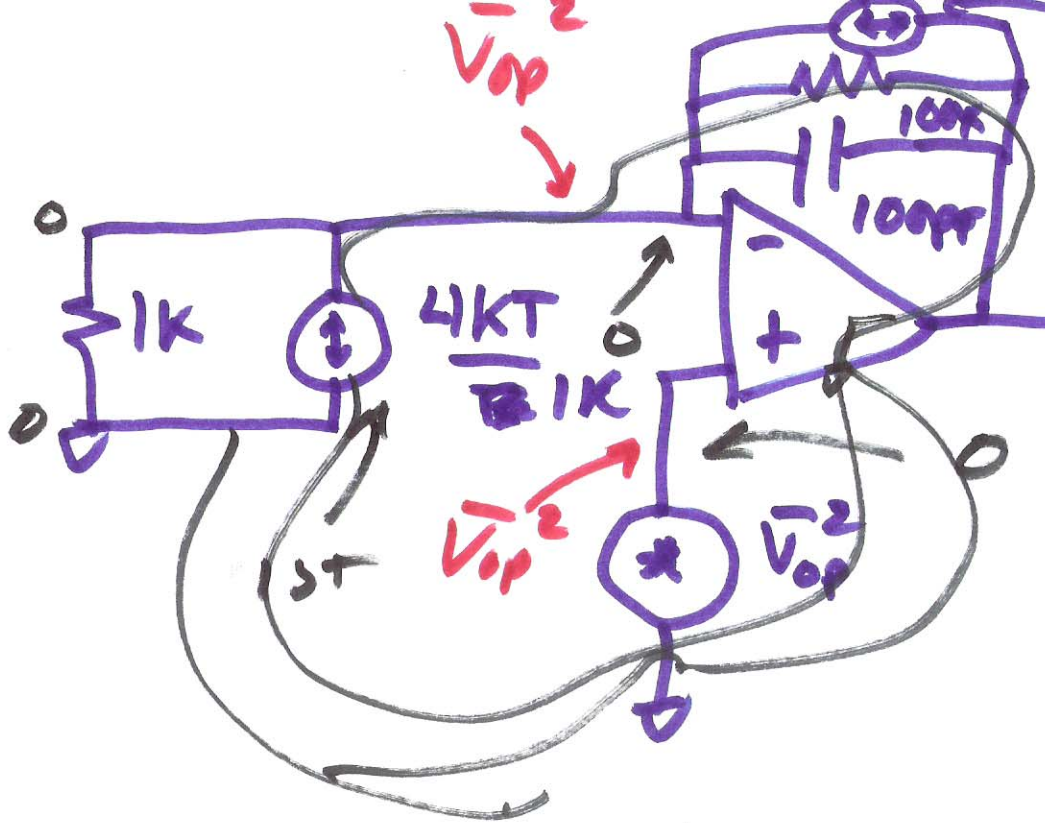
2)



$|A_{CL}(0)| = 100$

$100K = 10^{5}$

$100p = 10^{-10}$

$$\overline{V_{ONoise}^2} = \left(\frac{4KT}{1K} + \frac{4KT}{100K}\right) \cdot \left|\frac{100K}{1 + j\omega \cdot 10^{-5}}\right|^2$$

$$+ \overline{V_{op}}^2 \left(1 + \left|\frac{\frac{100K}{1 + j\omega 10^{-5}}}{1K}\right|\right)^2$$

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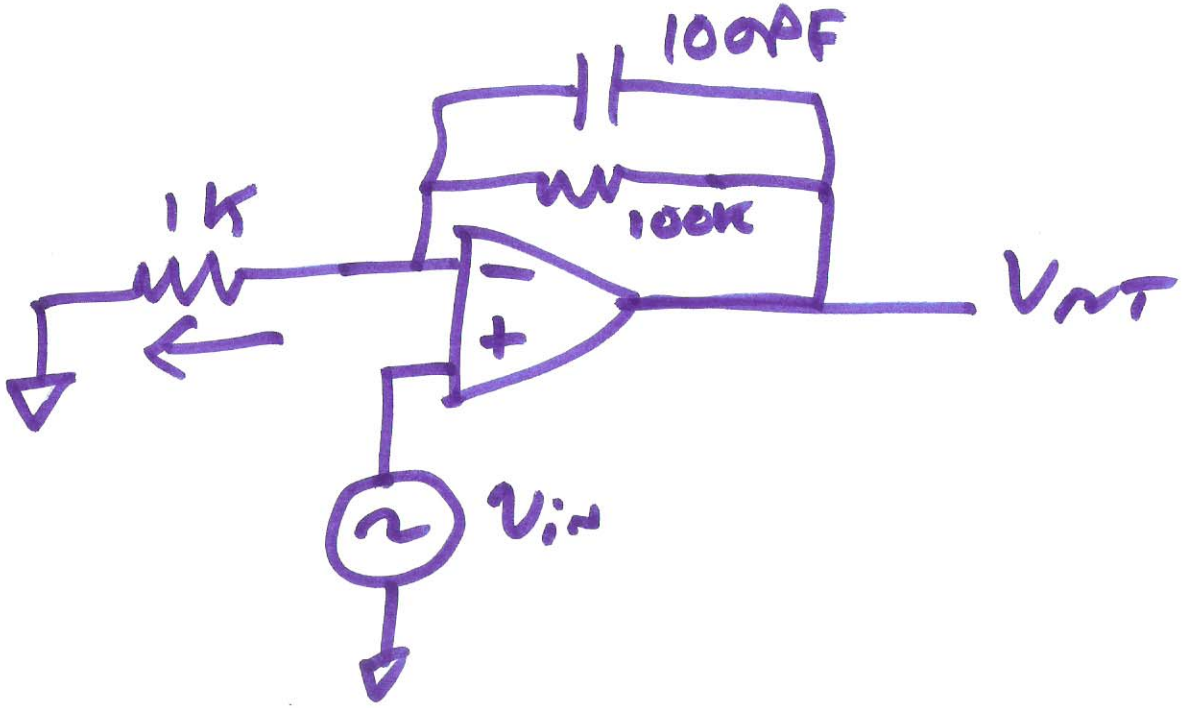
3)



$$\frac{V_{in}}{1K} = \frac{V_{out} - V_{in}}{\frac{100K}{1 + j\omega \cdot 10^{-5}}}$$

$$V_{in}\left(\frac{1}{1K} + \frac{\frac{1}{100K}}{1 + j\omega 10^{-5}}\right) = \frac{V_{out}\,\frac{100K}{1}}{\frac{100K}{1 + j\omega 10^{-5}}}$$

$$\frac{V_{RT}}{V_{in}} = 1 + \frac{\frac{100k}{1k}}{1 + jw\,10^{-5}}$$

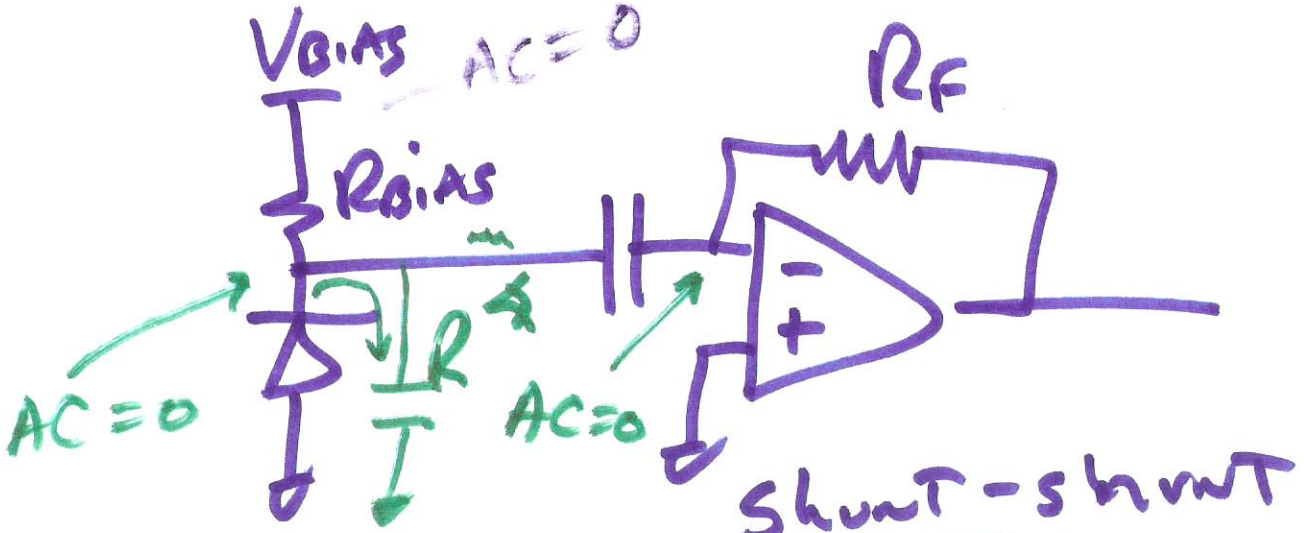
$$= 1 + \frac{\frac{100k}{1k}}{1 + jw\,10^{-5}}$$

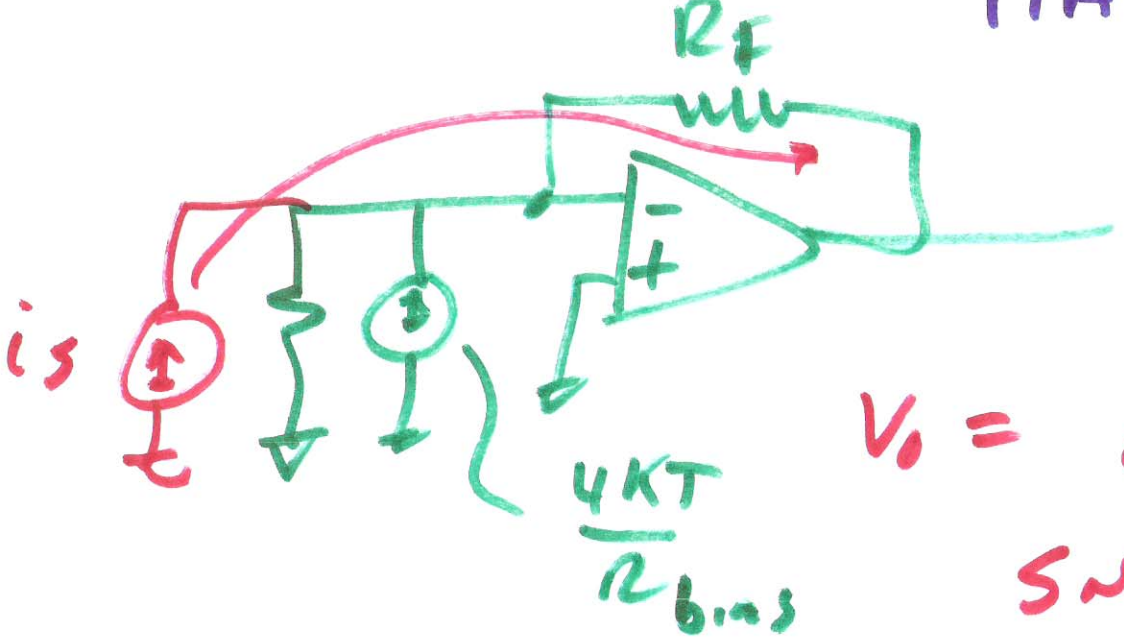
AT f_{3dB}

$$\frac{V_{RT}}{V_{in}} = 0.707 \cdot (101)$$

$$f_{3dB} \simeq \frac{1}{2\pi 10^{-5}} = 15.9\,kHz$$

$\Delta V = 0 = \Delta I \cdot R \to 0$

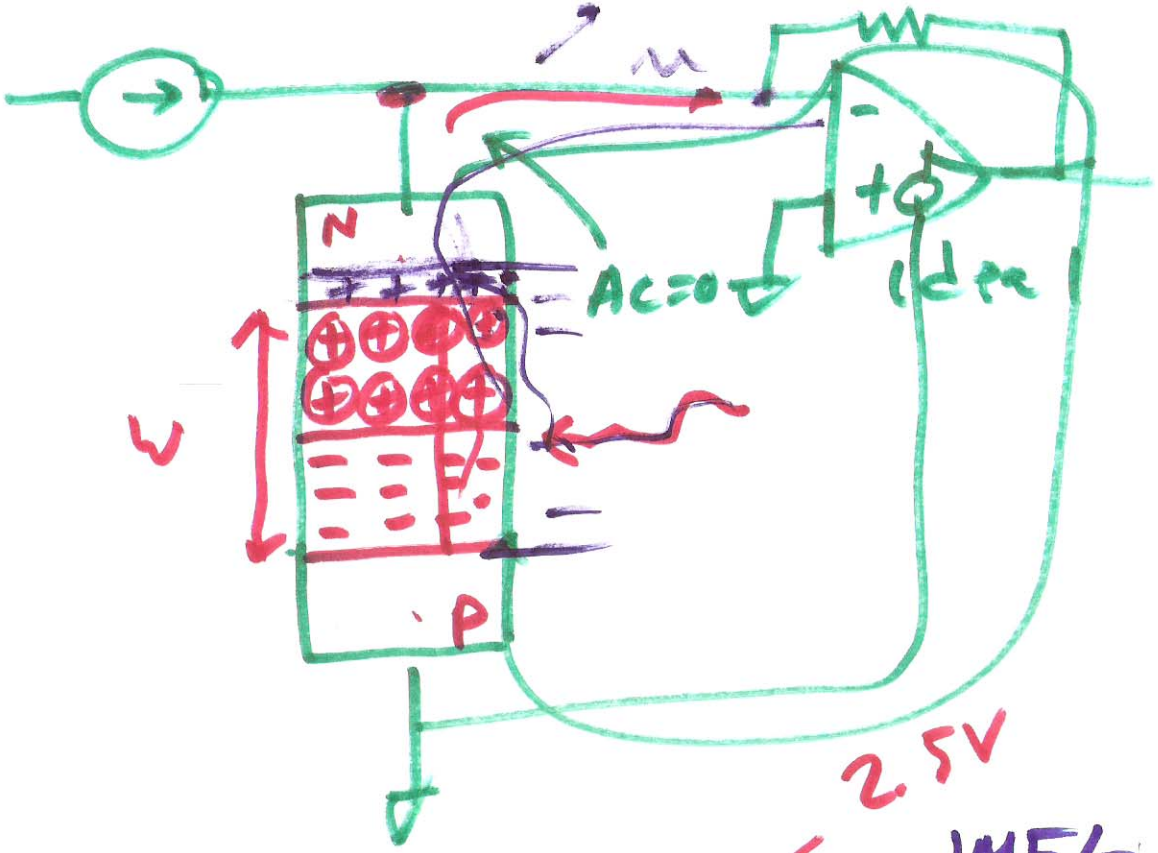


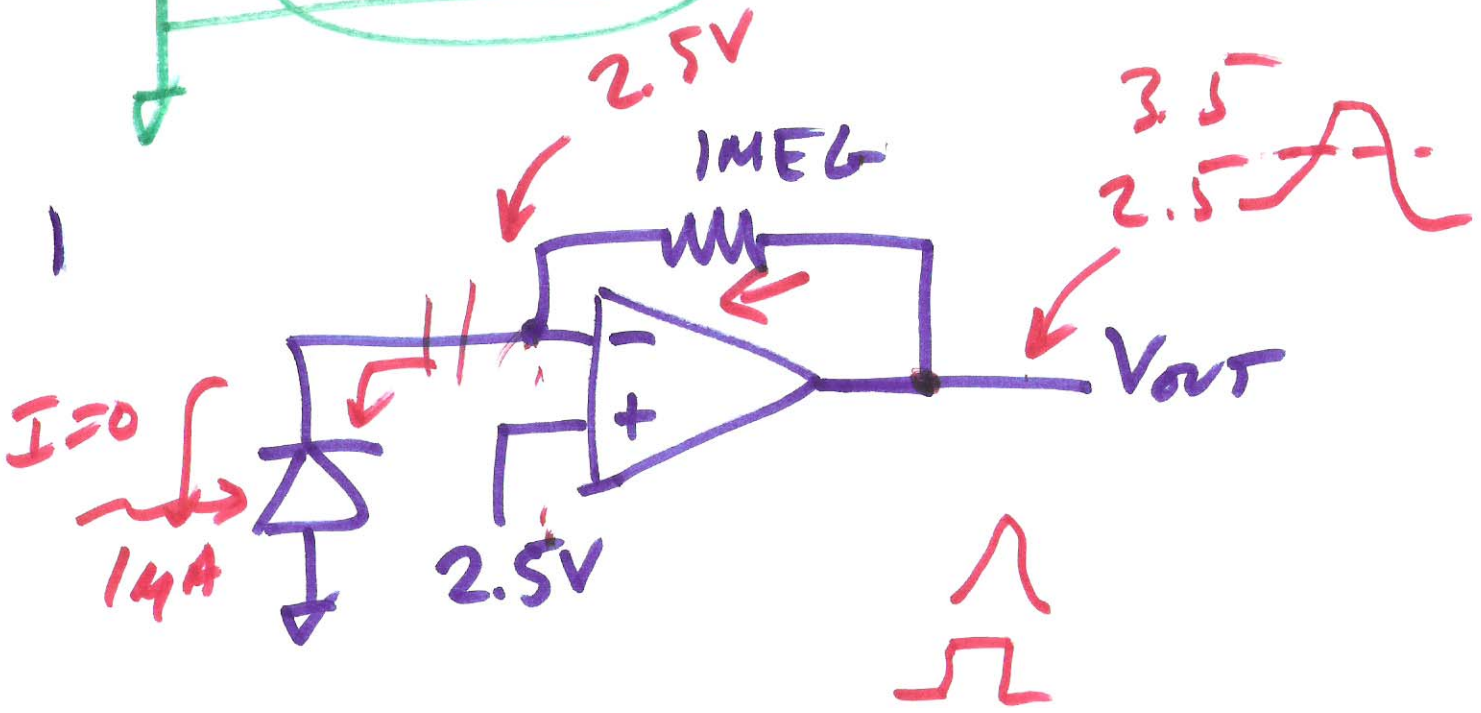


$$\frac{4KT}{R_{bias}} \cdot R_F^2 = \overline{i_{noise}^2}$$

$$V_o = i_s \cdot R_F$$

$$SNR = \frac{i_s \cdot R_F}{\sqrt{\frac{4KT}{R_{bias}} \cdot R_F^2}}$$





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