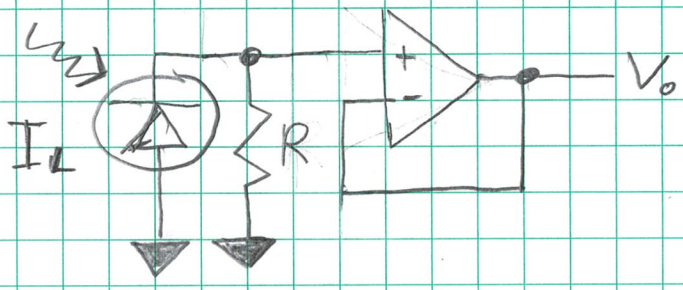
A photodiode is connected to a load resister, R, and the potential drop is sensed by a unity gain amplifier




① What is $V_o$ for the photocurrent $I_L$?

② Make a noise model for the circuit, i.e., add a thermal noise for "R" and replace the photodiode with a source of shot noise current. Draw the circuit. Hint: See "Handout on Noise".

③ What is the expression for the RMS noise output, denoted $\delta V_o$? Hint: Variances add.

④ What is the expression for the signal-to-noise ratio, denoted S/N.

⑤ Plot log (S/N) vs log ($I_p$). What happens near $I_p \simeq \frac{2 k_B T}{e} R$?

In addition, complete problems 1–3 in the handout "Notes on an "Op-Amp Differentiator Circuit"

Continued on Page

Read and Understood By

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