HW5 Book Exercise:

4.9 Assuming that the diodes in the circuits of Fig. P4.9 are ideal, find the values of the labeled voltages and currents.

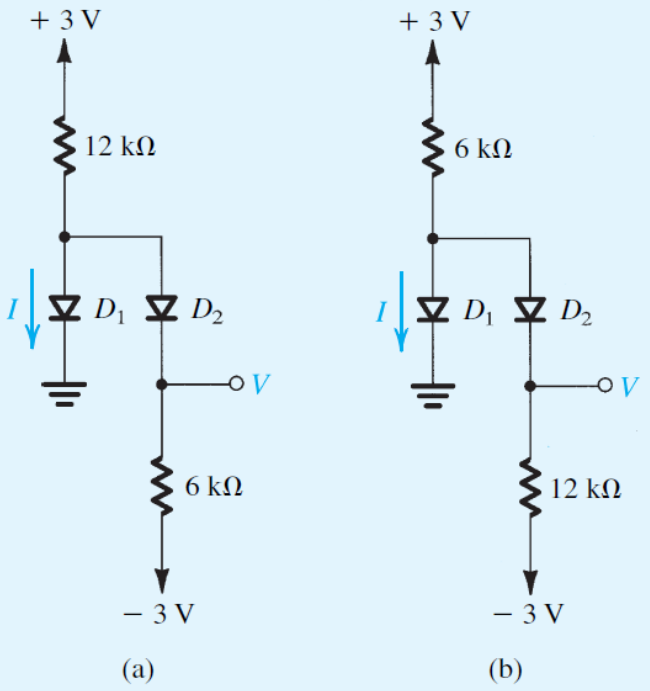

Figure P4.9

4.43 For the circuits in Fig. P4.9, using the constant-voltage-drop ($V_D = 0.7$ V) diode model, find the values of the labeled currents and voltages.

4.85 The op amp in the precision rectifier circuit of Fig. P4.85 is ideal with output saturation levels of ±13 V. Assume that when conducting the diode exhibits a constant voltage drop of 0.7 V. Find v_-, v_O, and v_A for:

(a) $v_I = +1$ V
(b) $v_I = +3$ V
(c) $v_I = -1$ V
(d) $v_I = -3$ V

Also, find the average output voltage obtained when v_I is a symmetrical square wave of 1-kHz frequency, 5-V amplitude, and zero average.

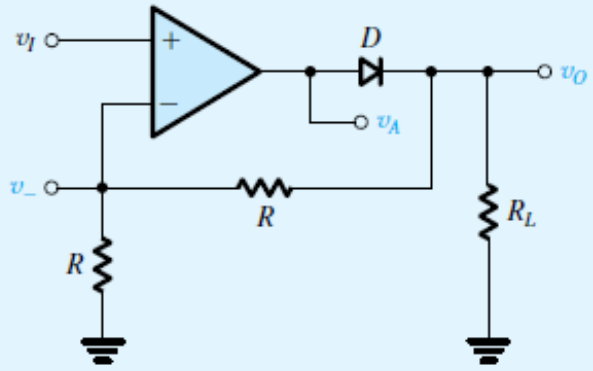

Figure P4.85

3.10 Holes are being steadily injected into a region of n-type silicon (connected to other devices, the details of which are not important for this question). In the steady state, the excess-hole concentration profile shown in Fig. P3.10 is established in the n-type silicon region. Here "excess" means over and above the thermal-equilibrium concentration (in the absence of hole injection), denoted p_{n0}. If $N_D = 10^{16}/\text{cm}^3$, $n_i = 1.5 \times 10^{10}/\text{cm}^3$, $D_p = 12\ \text{cm}^2/\text{s}$, and $W = 50$ nm, find the density of the current that will flow in the x direction.

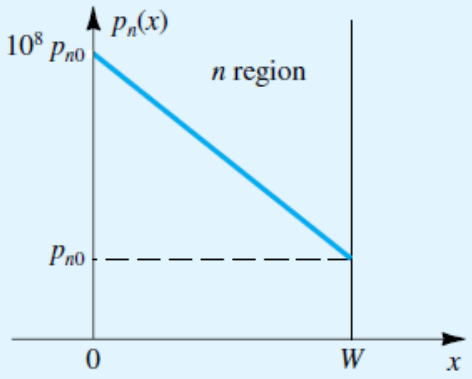

Figure P3.10