Ex: 4.6
Equation 4.5

$$V_2 - V_1 = 2.3\ V_T \log\left(\frac{I_2}{I_1}\right)$$

At room temperature $V_T = 25$ mV

$$V_2 - V_1 = 2.3 \times 25 \times 10^{-3} \times \log\left(\frac{10}{0.1}\right)$$

$$= 115 \text{ mV}$$

4.23

The voltage across three diodes in series is 2.4 V; thus the voltage across each diode must be 0.8 V.

Using $I_D = I_S e^{V_D / V_T}$, the required current is found to be 7.9 mA.

If 1 mA is drawn away from the circuit, I_D will be 6.9 mA, which would give $V_D = 0.794$ V, giving an output voltage of 2.39 V. Thus the change in output voltage is -10.15 mV.