Homework Assignment No. 1 – Solutions

Problem 1 (Corrected)

(a.) The first thing to do is to find Thevenin’s equivalent circuit seen from the diode.

The Thevenin voltage is,

\[ V_{TH} = V_{IN} \left( \frac{2}{3} \cdot \frac{1}{3} \right) = \frac{V_{IN}}{3} \]

The Thevenin resistance is,

\[ R_{TH} = 1k\Omega \parallel 2k\Omega + 1k\Omega \parallel 2k\Omega = \frac{4}{3} \text{ k}\Omega \]

The equivalent circuit now becomes,

Now, with \( V_{IN} = 10\text{V} \), we know the diode is forward biased. Therefore, replacing it with a short-circuit gives,

\[ V_D = 0\text{V} \quad \text{and} \quad I_D = \frac{10}{3} \times \frac{3}{4k\Omega} = 2.5 \text{ mA} \]

(b.) With \( V_{IN} = -10\text{V} \), we know the diode is reverse biased. Therefore replacing it with an open-circuit gives,

\[ V_D = -3.33\text{V} \quad \text{and} \quad I_D = 0 \text{ mA} \]