3. From the diagram, by KVL

\[ I_{in} = \frac{s2C_X}{2} [V_{in} - V_{out}] = sC_X V_{in} [1 - H(s)] \]

From the formula

\[ H(s) = \frac{V_{out}(s)}{V_{in}(s)} = \frac{s^2\left(\frac{C_X}{C_X + C_B}\right) + s\left(\frac{G_{m5}}{C_X + C_B}\right) + \left(\frac{G_{m2}G_{m4}}{C_A(C_X + C_B)}\right)}{s^2 + s\left(\frac{G_{m3}}{C_X + C_B}\right) + \left(\frac{G_{m1}G_{m2}}{C_A(C_X + C_B)}\right)} \]

\[ H(\infty) = \frac{C_X}{C_X + C_B} \quad \text{and} \quad H(0) = \frac{G_{m4}}{G_{m1}} \]

Hence,

\[ Z_{in} = \frac{V_{in}}{I_{in}} = \frac{1}{sC_X [1 - H(s)]} \]

At high frequency \((s \to \infty)\)

\[ Z_{in} \to \frac{C_X + C_B}{sC_X C_B} \]

At low frequency \((s \to 0)\)

\[ Z_{in} \to \frac{G_{m1}}{sC_X (G_{m1} - G_{m4})} \]

\[ \to C_X (1 - H(\infty)) \]