









$$I_1 = \frac{V_2 - V_1}{R_1} = \frac{V_2}{R_1} - \frac{V_1}{R_1}$$

$$V_2 = I_2 \cdot R_2 = g_m \cdot V_1 \cdot R_2$$

$$I_1 = \frac{V_2}{R_1} - \frac{V_1}{R_1} = \frac{g_m R_2}{R_1} \cdot V_1 - \frac{V_1}{R_1}$$

$$I_1(s) = V_1(s) \cdot \left(\frac{g_m R_2}{R_1} - \frac{1}{R_1} \right)$$

$$I_1(s) = V_1(s) \cdot \left(\frac{g_m R_2 - 1}{R_1} \right)$$

$$Z_{in}(s) = \frac{V_1(s)}{I_1(s)} = \frac{R_1}{g_m R_2 - 1}$$

