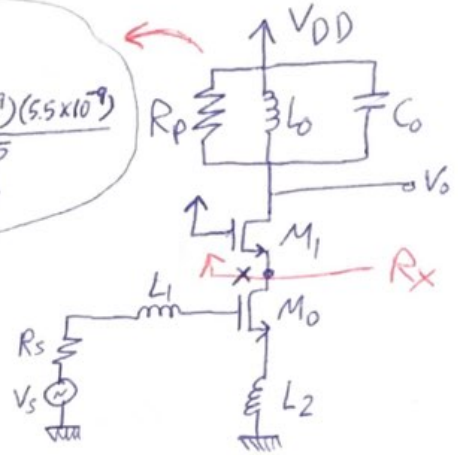
$$* R_p = R_s (1 + Q_o^2)$$
$$= 7.5 \left(1 + (8.75457)^2\right)$$
$$= 582.3189\ \Omega$$

$$Q_o = \frac{\omega_o L_o}{R_s} = \frac{(2\pi \times 1.9 \times 10^9)(5.5 \times 10^{-9})}{7.5} = 8.75457$$



$$* R_x = \frac{1}{g_{m_2}} + \frac{R_p}{g_{m_2} r_{o_2}} \simeq \frac{1}{g_{m_2}}$$

$$\hookrightarrow A_{V_o} = -g_{m_o} R_x \simeq -\frac{g_{m_o}}{g_{m_1}}$$

$$\hookrightarrow A_{V_1} = V_o / V_x = g_{m_1} R_p$$

$$\therefore |A_{V_{total}}| = \frac{1}{2} Q_i A_{V_o} A_{V_1} = \frac{1}{2} Q_i g_{m_o} R_p$$

$$Q_i = \frac{1}{\omega_o R_s C_{gs}} = \frac{1}{(2\pi \times 1.9 \times 10^9)(50)(408.486 \times 10^{-15})} = 4.101279$$

$$\therefore A_{V_{total}} = \frac{1}{2}(4.101279)(0.011647)(582.3189) = 13.90799$$

$$A_{V_{t(dB)}} = 20 \log(13.90799) = \underline{22.87\ dB}$$

$$* Z_{in} = \omega_T L_2 = \frac{g_{m_o}}{C_{gs}} L_2$$
$$= \frac{0.011647 \times 1.4 \times 10^{-9}}{408.486 \times 10^{-15}} = \underline{39.9176\ \Omega}$$

→ From Simulation:

$$S_{11_{dB}} = -16.5097 = 20 \log\left(\left|\frac{Z_{in} - 50}{Z_{in} + 50}\right|\right)$$

$$\therefore Z_{in} = 36.99762\ \Omega$$

Could be +ve or -ve

$$* NF = 1 + \frac{\gamma}{Q_i^2 g_{m_o} R_s}$$

$$= 1 + \frac{1}{(4.101279)^2 (0.011647)(50)} = 1.10209$$

$$\therefore NF_{(dB)} = 10 \log(1.10209) = \underline{0.422165\ dB}$$