$$I_{CQ1} = I_{CQ2} = \frac{V_{cc} - (V_{BE} + 0.7)}{R_Q} = 1.93\,mA$$

$$I_{CQ3} = I_{CQ4} = \frac{I_{CQ2}}{2} = 0.965\,mA$$

$$g_{m1} = g_{m2} = (1.93\,mA)(40V^{-1}) = 77.2\,mA/V$$

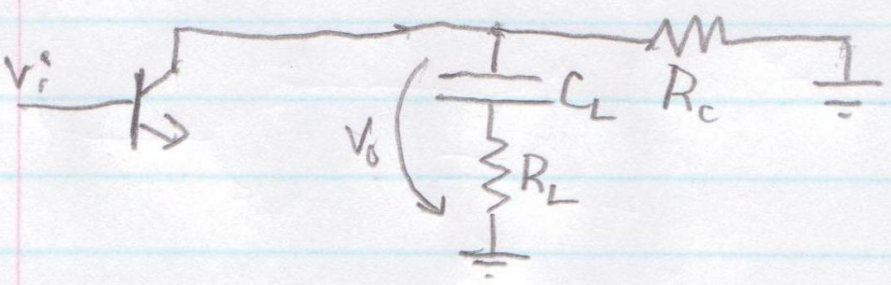
$$g_{m3} = g_{m4} = (0.965\,mA)(40V^{-1}) = 38.6\,mA/V$$

$$r_{\pi 3} = r_{\pi 4} = \frac{B}{g_{m3}} = 2590\,\Omega$$

$$r_{O3} = r_{O4} = \frac{V_A}{I_{CQ3}} = \frac{100V}{0.965\,mA} = 103626\,\Omega$$

$$r_{TAIL} = \frac{100}{1.93\,mA} = 51813\,\Omega$$

Differential Mode Gain



$$\frac{V_o}{V_i} = -g_{mBOT}\left(R_c \,||\, (C_L + R_L)\right)$$

$$= -g_{mBOT}\frac{R_c C_L + R_c R_L}{R_c + C_L + R_L} = \frac{R_c\left(\frac{1}{j\omega C_L} + R_L\right)}{R_c + \frac{1}{j\omega C_L} + R_L}$$

$$= -g_{mBOT}\frac{R_c + j\omega C_L R_L}{j\omega R_c C_L + j\omega R_L C_L + 1}$$