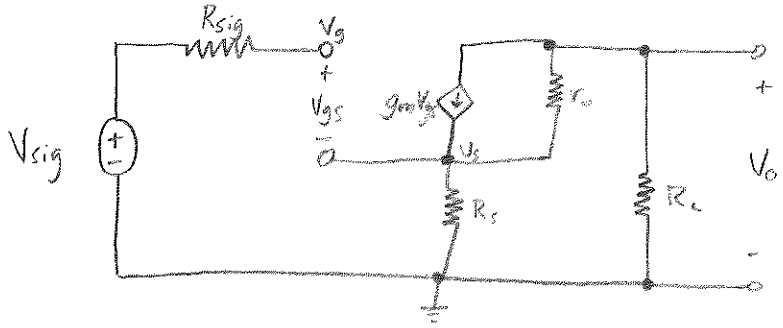
1.



① $\frac{V_o - 0}{R_L} = g_m V_{gs} + \frac{V_o - V_s}{r_o}$ ② $V_{gs} = V_g - V_s$ $= V_{sig} - V_s$ ③ $\frac{V_s - 0}{R_s} = \left(-\frac{V_o}{R_L}\right) R_s$

$V_s = -\frac{V_o R_s}{R_L}$

② → ①: $\frac{V_o}{R_L} = g_m (V_{sig} - V_s) + \frac{V_o - V_s}{r_o}$

$\frac{V_o}{R_L} = g_m V_{sig} - g_m V_s + \frac{V_o - V_s}{r_o}$

Now Plug ③ in: $\frac{V_o}{R_L} = g_m V_{sig} - g_m \left(-\frac{V_o R_s}{R_L}\right) + \frac{V_o + \frac{V_o R_s}{R_L}}{r_o}$