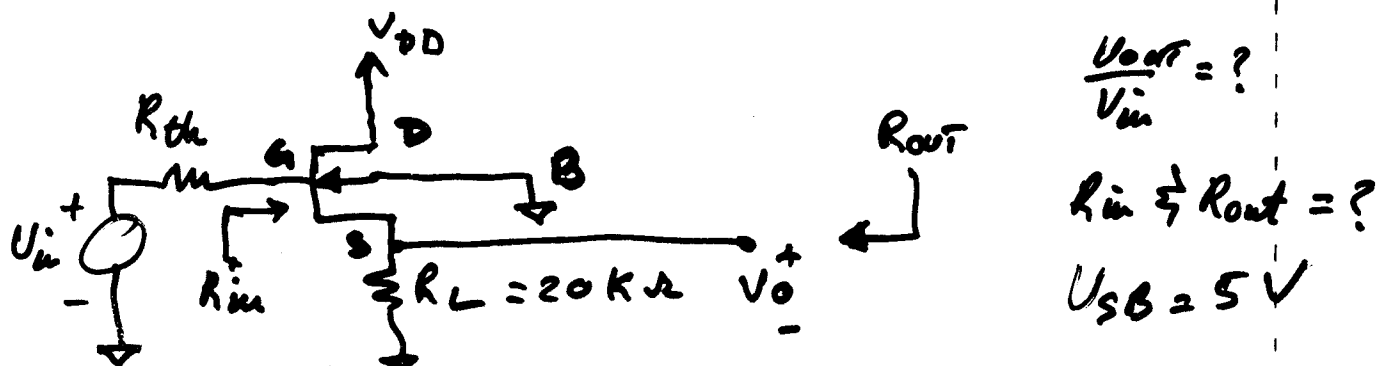
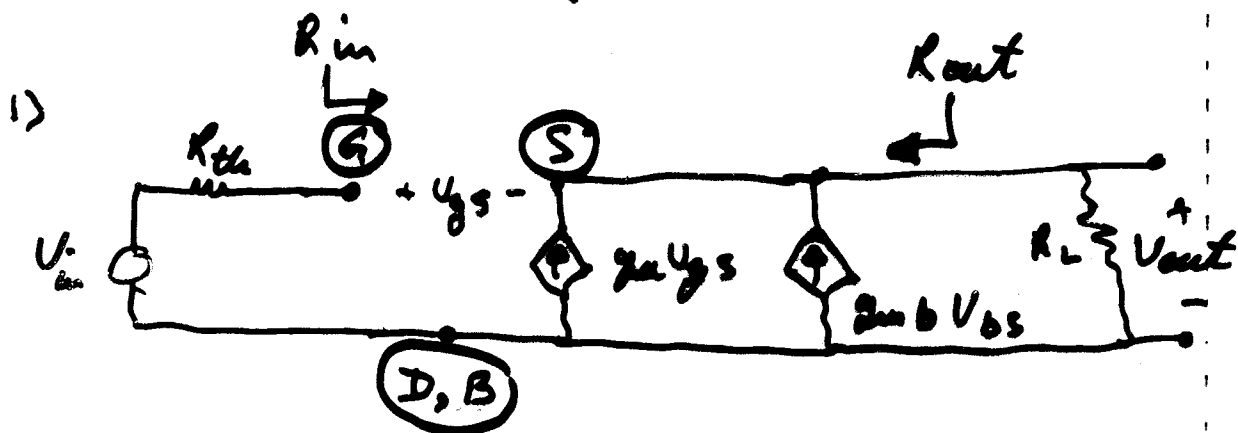


SOURCE FOLLOWER WITH BULK EFFECT



$$K_n = 500 \mu A/V^2, \quad V_{TN} = 1V, \quad \lambda = 0$$

$$\gamma = 0.75 V^{1/2} \quad \& \quad 2\phi_F = 0.6$$



$$2) \quad g_m = \sqrt{2 K_n I_{DS}} = 491 \mu S$$

$$g_{mb} = \frac{\gamma g_m}{2 \sqrt{V_{SB} + 2\phi_F}} = 77.8 \mu S$$

$$\begin{aligned}
 3) \quad V_{out} &= (g_m V_{gs} + g_{mb} V_{bs}) R_L \\
 &= g_m R_L (V_g - V_s) + g_{mb} R_L (V_b - V_s) \\
 &= g_m R_L (V_g - V_{out}) + g_{mb} R_L (0 - V_{out})
 \end{aligned}$$

$$= g_m R_L \cdot V_{in} - (g_m + g_{mb}) R_L \cdot V_{out}$$

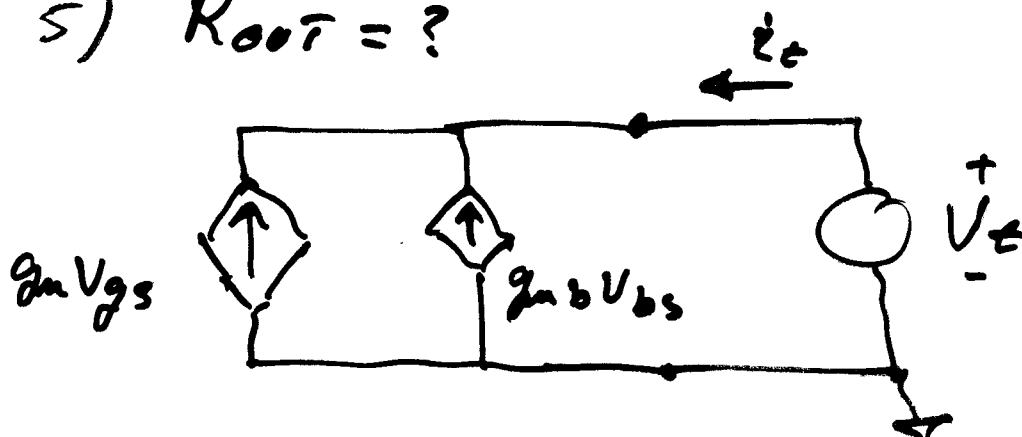
$$\therefore V_{out} (1 + g_m R_L + g_{mb} R_L) = g_m R_L V_{in}$$

$$\Rightarrow \frac{V_{out}}{V_{in}} = \frac{g_m R_L}{1 + g_m R_L + g_{mb} R_L}$$

$$\frac{V_{out}}{V_{in}} = 0.793 \left[\frac{V}{V} \right]$$

4) $R_{in} = \infty$

5) $R_{out} = ?$



$$i_t = -g_m V_{gs} - g_{mb} V_{bs} = -g_m (V_g - V_s) - g_{mb} (V_b - V_s)$$

$$i_t = -g_m (0 - V_t) - g_{mb} (0 - V_t) \\ = (g_m + g_{mb}) V_t$$

$$\Rightarrow R_{out} = \frac{1}{g_m + g_{mb}} = \underline{1.76 \text{ k}\Omega}$$