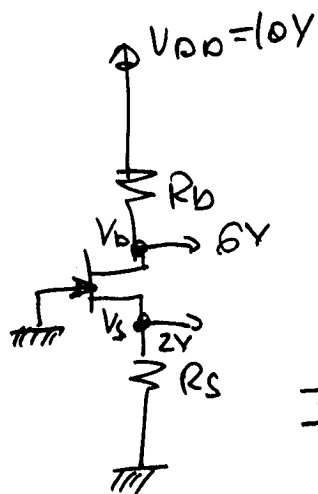
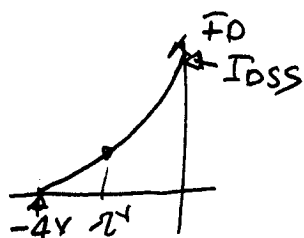




JFET. n

$$I_D = 4 \text{ mA} \quad V_D = 6 \text{ V}$$

$$V_{D0} = -4 \text{ V} \quad I_{DSS} = 16 \text{ mA}$$



$$k = \frac{I_{DSS}}{V_T^2} = \frac{16 \text{ mA}}{16 \text{ mA}} = 1 \frac{\text{mA}}{\text{V}^2}$$

saturation $\Rightarrow I_D = k(V_{GS} - V_T)^2$

$$4 = 1(V_{GS} - (-4))^2$$

$$\uparrow V_{GS} = -2 \text{ V}$$

$$V_{DS} = 4 \text{ V} > (V_{GS} - V_T) = 2 \text{ V}$$

$$R_S = \frac{V_S}{I_D} = \frac{2}{4} = 0.5 \text{ k}\Omega$$

$$R_D = \frac{10 - 6}{4} = 1 \text{ k}\Omega$$

$$g_m = \frac{\partial I_D}{\partial V_{GS}} = \frac{\partial}{\partial V_{GS}} (k(V_{GS} - V_T)^2) = 2k(V_{GS} - V_T) = g_m$$

$$g_m = (\mu_n C_{ox}) \left(\frac{W}{L} \right) (V_{GS} - V_T)$$

$$g_m = \frac{I_D}{V_{GS} - V_T} = \frac{I_D}{\sqrt{\frac{I_D}{k}}} = \sqrt{k I_D}$$

$$g_m = 2\sqrt{k I_D}$$

$$= 2\sqrt{1 \cdot 4} = 4 \text{ mA/V}$$

$$g_m \propto \sqrt{I_D}$$

$$g_m \propto \sqrt{\frac{W}{L}}$$