In Class Problem Solution (Jan 17th, 2013)

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Solution 3.30

$$V_G = \left(\frac{22}{22+8}\right)(6) - 3 = 1.40\,\text{V}$$

$$3 = K_p R_S \left(V_{SG} + V_{TP}\right)^2 + V_{SG} + V_G$$

$$3 = (0.5)(0.5)\left(V_{SG}^2 - 1.6V_{SG} + 0.64\right) + V_{SG} + 1.40$$

$$0.25V_{SG}^2 + 0.6V_{SG} - 1.44 = 0 \Rightarrow V_{SG} = 1.483\,\text{V}$$

$$I_D = (0.5)(1.483 - 0.8)^2 = 0.2332\,\text{mA}$$

$$V_{SD} = 6 - (0.2332)(0.5 + 5) = 4.72\,\text{V}$$