Problem 1. Textbook 16.13. (You can use that the oxide permittivity is 
\[ \varepsilon_{ox} = 3.9 \times 8.85 \times 10^{-14} \text{ F/cm} \], while semiconductor permittivity is 
\[ \varepsilon = 11.8 \times 8.85 \times 10^{-14} \text{ F/cm} \].

Hint: For part (e) use Fig. 16.9 in the textbook.

Problem 2. Textbook 16.14 (Parts b and c only). You can assume use that the oxide permittivity
is \[ \varepsilon_{ox} = 3.9 \times 8.85 \times 10^{-14} \text{ F/cm} \], while semiconductor permittivity is \[ \varepsilon = 11.8 \times 8.85 \times 10^{-14} \text{ F/cm} \], 
\[ n_i = 10^{10} \text{ cm}^{-3} \].

Problem 3. Compute the transconductance 
\[ g_m = \frac{\partial I_D}{\partial V_G} \bigg|_{V_G=\text{const.}} \] and the drain conductance 
\[ g_d = \frac{\partial I_D}{\partial V_D} \bigg|_{V_G=\text{const.}} \] of a MOSFET. Consider two cases:
(a) below pinch-off \( V_G < V_{th} \),
(b) above pinch-off \( V_G > V_{th} \).

Note: you can check your results against Table 17.1 in the Textbook (the square law equations).

Problem 4. Textbook 17.2 (Parts a, b, d, and e only).