Nanyang Technological University
School of Electrical & Electronic Engineering
E2002 Analog Electronics – Tutorial 7

1. Check if the region of operation for the following circuits. Determine the operating point if it is in saturation. Assume $\lambda = 0$. $V_{TN} = 1$ V and $K_n = 0.5$ mA/V^{-1} for NMOS and $V_{TP} = -1$ V and $K_p = 250$ μA/V^{-1} for PMOS.

   (Ans: (a) Saturation region, $V_{DS} = 16.28$ V, $I_D = 3.43$ mA; (b) triode region)

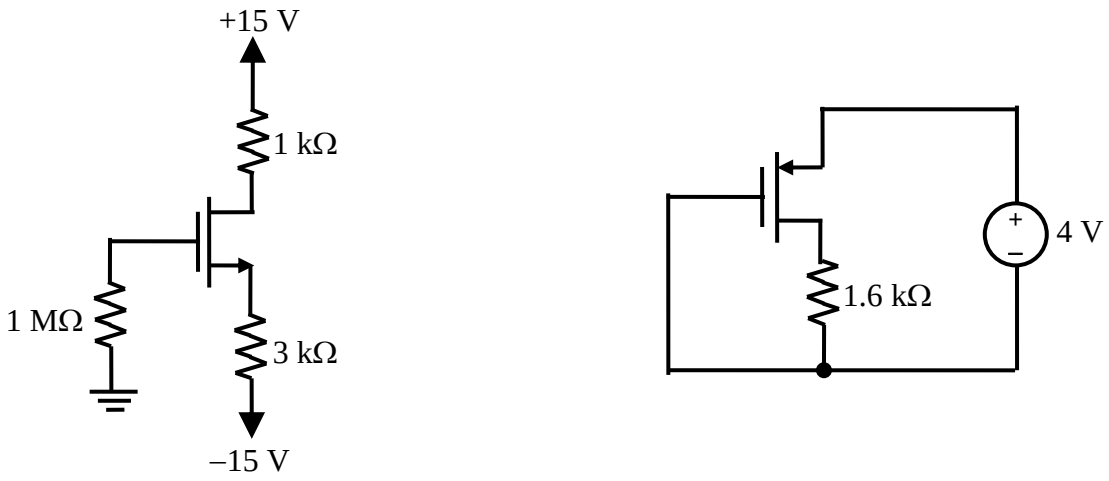

Figure 1

2. Draw the DC equivalent circuit for the common drain amplifier of Figure 2. Assume that the capacitors have infinite value, $K_n = 1$ mA/V^2, $V_{TN} = 1$V, $R_I = 100$ Ω, $R_1 = 1.2$ MΩ, $R_2 = 910$ kΩ, $R_L = 250$ Ω, $R_S = 3$ kΩ and $V_{DD} = 15$ V, calculate the DC operating point of the amplifier.
   (Ans: $I_D = 1.87$ *mA*, $V_{DS} = 9.39$ V).

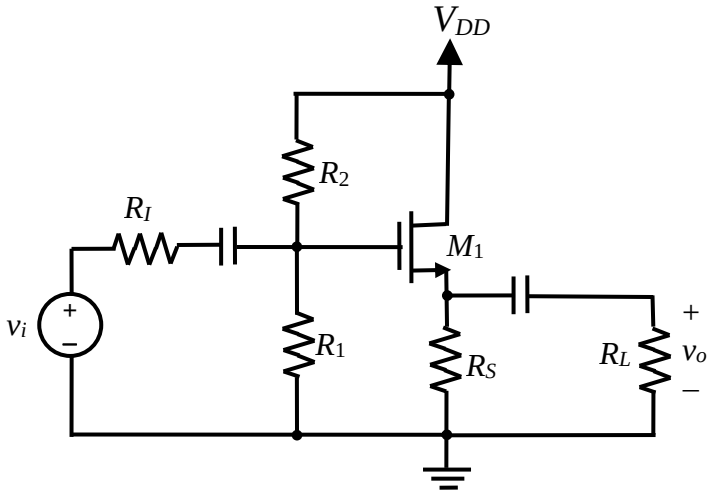

Figure 2