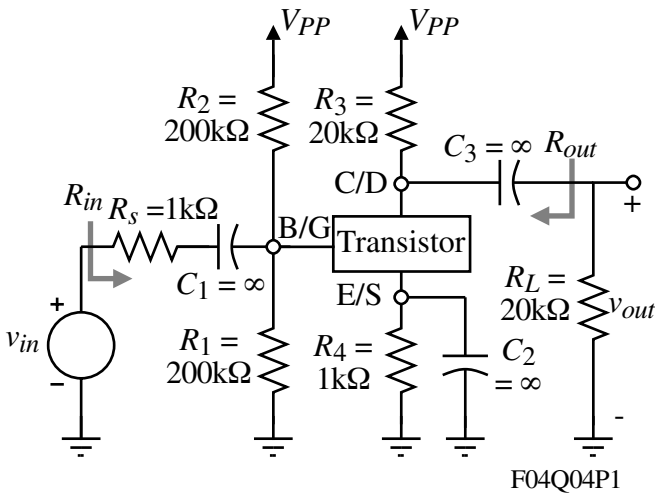
QUIZ NO. 4

NAME_____Score_____/10

(a.) Replace the transistor in the circuit shown with a npn BJT that has a $\beta_o = 100$, $V_T = 25\text{mV}$, and $V_A = \infty$. Assume that $I_{CQ} = 0.5\text{mA}$ and find the numerical values of voltage gain, v_{out}/v_{in}, R_{in}. and R_{out}.

(b.) Replace the transistor in the circuit shown with a NMOS FET that has a $K_n = 1\text{mA/V}^2$ and $\lambda = 0$. Assume that $I_{DQ} = 0.5\text{mA}$ and find the numerical values of voltage gain, v_{out}/v_{in}, R_{in}. and R_{out}.. (Hint: let r_π of part (a.) be ∞.)



c.) In your own words tell why the small-signal voltage gain of the BJT CE amplifier is greater (roughly x10) than the small-signal voltage gain of the NMOS CS amplifier when the currents are the same and the external circuit is the same.