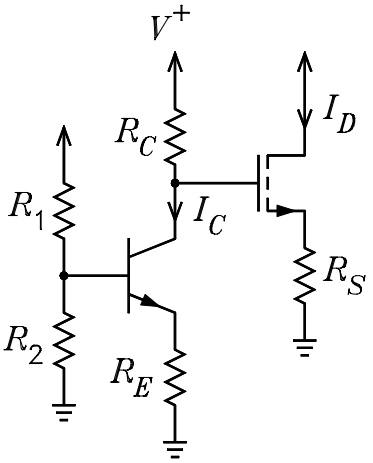
ECE 3050 Analog Electronics Quiz 2

January 23, 2009

Professor Leach Last Name:_____ First Name:_____

Instructions. Print your name in the spaces above. Place a box around any answer. **Honor Code Statement:** *I have neither given nor received help on this quiz.* Initials _____

1. For the circuit given, $V^+ = 24\,\text{V}$, $R_1 = 112\,\text{k}\Omega$, $R_2 = 10\,\text{k}\Omega$, $V_{BE} = 0.65\,\text{V}$, $\beta = 99$, $\alpha = 0.99$, $R_S = 4\,\text{k}\Omega$, $K = 0.5\,\text{mA/V}$, $V_{TO} = 2\,\text{V}$, $I_C = \alpha I_E = \beta I_B$, and $I_D = K\,(V_{GS} - V_{TO})^2$.
   (a) Solve for R_E for $I_C = 1.2\,\text{mA}$.
   (b) Solve for R_C for $I_D = 2\,\text{mA}$.



$R_1 := 112000$ $R_2 := 10000$ $V_{BE} := 0.65$ $\beta := 99$ $\alpha := 0.99$ $R_S := 4000$

$K := 0.0005$ $V_{TO} := 2$ $V_p := 24$ $I_C := 0.0012$ $I_D := 0.002$

$V_{BB} := V_p \cdot \frac{R_2}{R_1 + R_2}$ $V_{BB} = 1.967$ $R_{BB} := R_p(R_1, R_2)$ $R_{BB} = 9.18 \cdot 10^3$

$R_E := \frac{\alpha}{I_C} \cdot \left(V_{BB} - \frac{I_C}{\beta} \cdot R_{BB} - V_{BE} \right)$ $R_E = 994.898$

$V_{GS} := \sqrt{\frac{I_D}{K}} + V_{TO}$ $V_{GS} = 4$ $V_C := I_D \cdot R_S + V_{GS}$ $V_C = 12$

$R_C := \frac{V_p - V_C}{I_C}$ $R_C = 1 \cdot 10^4$