

## ECE 3050 Analog Electronics Quiz 4

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Professor Leach      Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_

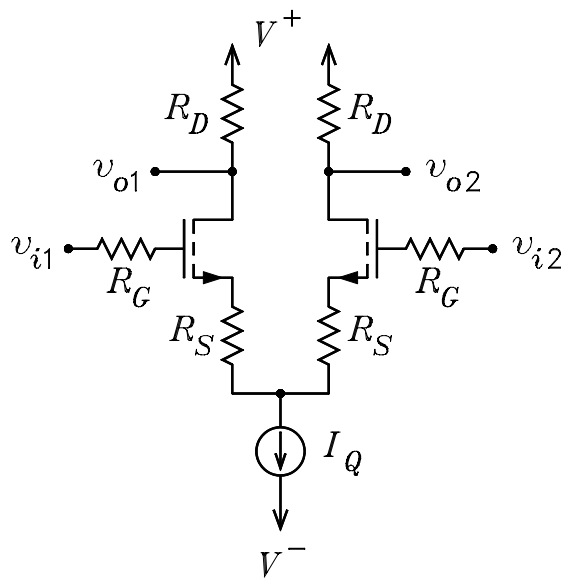
**Instructions. Print** your name in the spaces above. Place a box around any answer. **Honor Code Statement:**

*I have neither given nor received help on this quiz.* Initials \_\_\_\_\_

$$i_D = K (v_{GS} - V_{TO})^2 \quad g_m = 2\sqrt{KI_D} \quad r_s = \frac{1}{g_m} \quad r_0 = \frac{1}{\lambda} + \frac{V_{DS}}{I_D} \quad r_{id} = r_0(1 + g_m R_{ts}) + R_{ts}$$

For credit, you must give all equations that you use to calculate your answers. Credit will not be given for any answer without full supporting work.

1. For  $V^+ = 24\text{ V}$ ,  $V^- = -24\text{ V}$ ,  $I_Q = 2\text{ mA}$ ,  $R_G = 1.2\text{ k}\Omega$ ,  $R_S = 200\ \Omega$ ,  $R_D = 8.25\text{ k}\Omega$ ,  $K = 6.4 \times 10^{-4}\text{ A/V}^2$ , and  $\lambda = 0$ , solve for  $v_{o1}$  and  $v_{o2}$  as functions of  $v_{i1}$  and  $v_{i2}$ .



$$K := 0.00064 \quad I_Q := 0.002 \quad I_D := \frac{1}{2} \cdot I_Q$$

$$g_m := 2 \cdot \sqrt{K \cdot I_D} \quad g_m = 1.6 \cdot 10^{-3} \quad r_s := g_m^{-1} \quad r_s = 625$$

$$R_G := 1200 \quad R_S := 200 \quad R_D := 8250$$

$$A_v := \frac{-R_D}{2 \cdot (r_s + R_S)} \quad A_v = -5$$