NAME _____ NETID _____

MIDTERM EXAM 2

(Closed book)

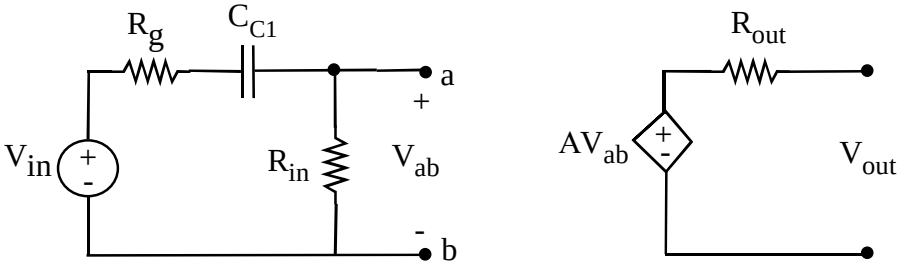
ECE 442 April 13, 2006

7:00 p..m. – 8:30 p.m.

Instructions: Write your name, and NetID where indicated. This examination consists of 4 problems. You are allowed to use a calculator and a formula sheet ($8^{1/2}$ by 11 in). Show all work.

Problem1 15 pts	Problem 2 25 pts	Problem 3 50 pts	Problem 4 10 pts	Total

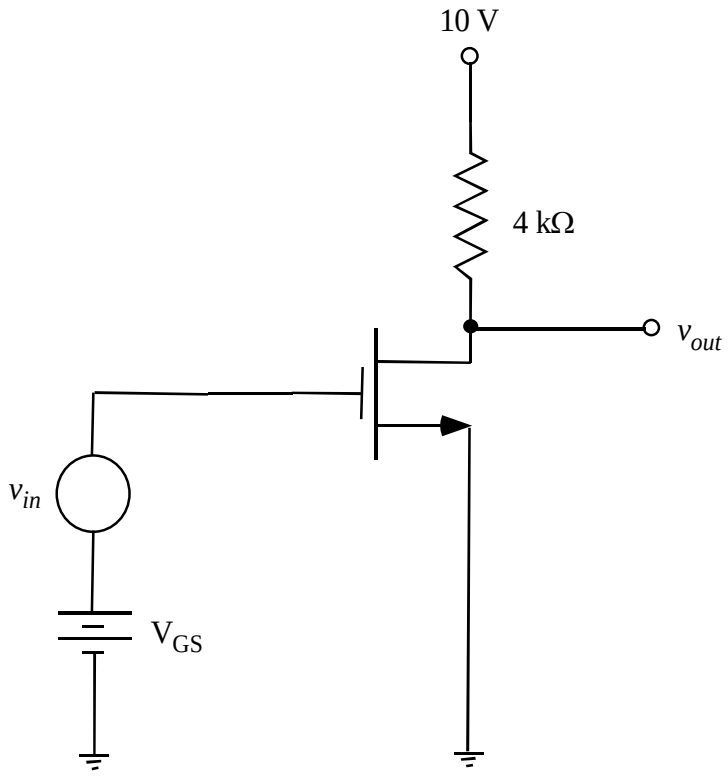
1. In the circuit shown, assume R_g = 1 kΩ, R_{in}= 10 kΩ, and the midband voltage gain is -12 V/V. Choose a value for C_{c1} that will result in a 3-dB frequency of 6 Hz. (15 pts)



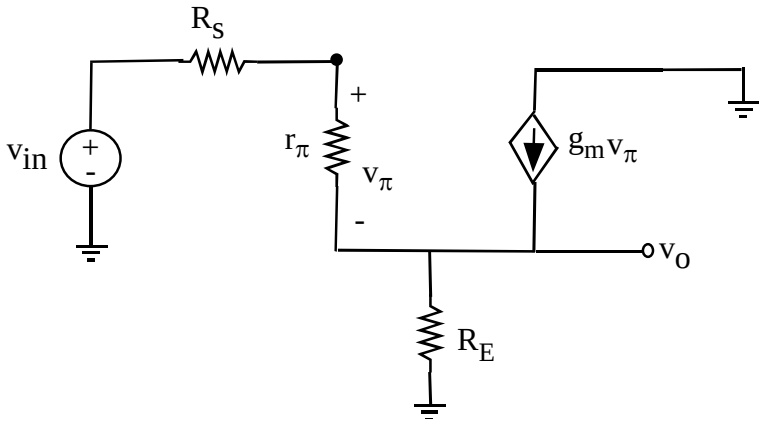
2. For the amplifier shown $\mu WC_{ox}/2L = 3$ mA/V^2, $\lambda = 0.02$/V, and $V_T = 1.0$ V.

(a) Calculate V_{DSQ} when $V_{GSQ} = 1.5$ V (15 pts).

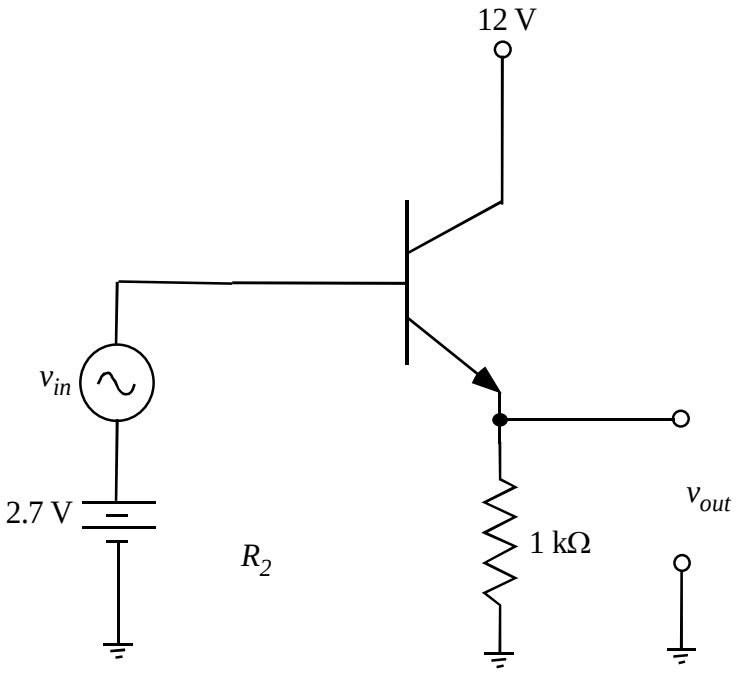
(b) Calculate the midband voltage gain for the stage (10 pts).



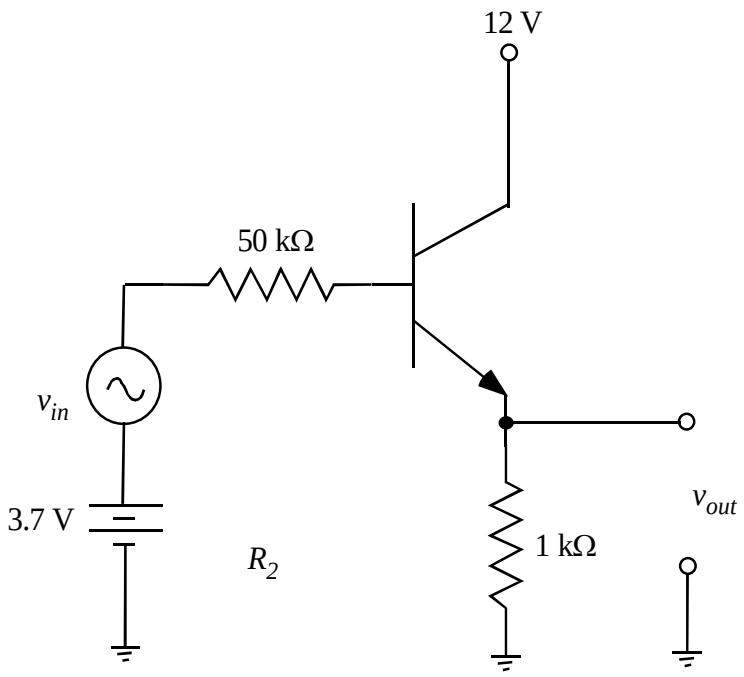
3. If $V_{BE}(on)$=0.6V and β = 100, calculate the midband voltage gain for the circuits shown. It is best to derive the general solution for the midband voltage gain for (b) first.



(a) (15 pts)



(b) (35 pts)


12 V
50 kΩ
v_{in}
3.7 V
R_2
1 kΩ
v_{out}

4. For the circuit shown, determine the values of:

(a) v_1 (2 pts) $\Rightarrow$

(b) i_1 (2 pts) $\Rightarrow$

(c) i_2 (1 pt) $\Rightarrow$

(d) v_o (2 pts) $\Rightarrow$

(e) i_L (2 pts) $\Rightarrow$

(f) i_o (1 pt) $\Rightarrow$