Midterm 2 Review

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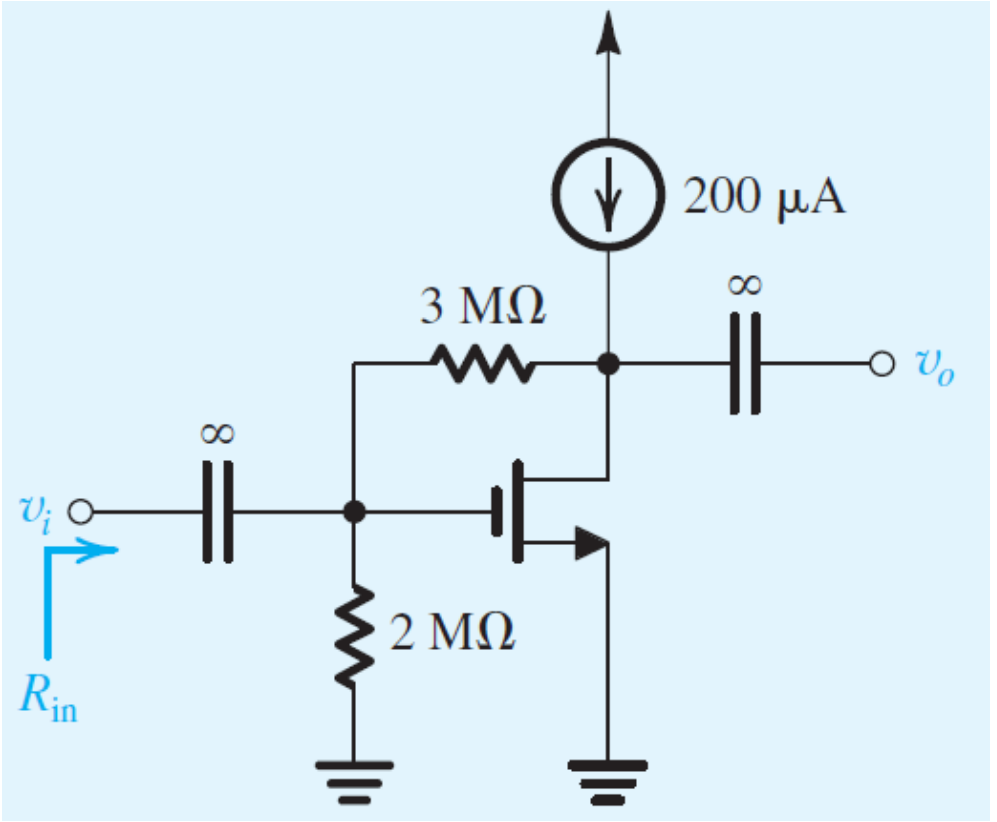
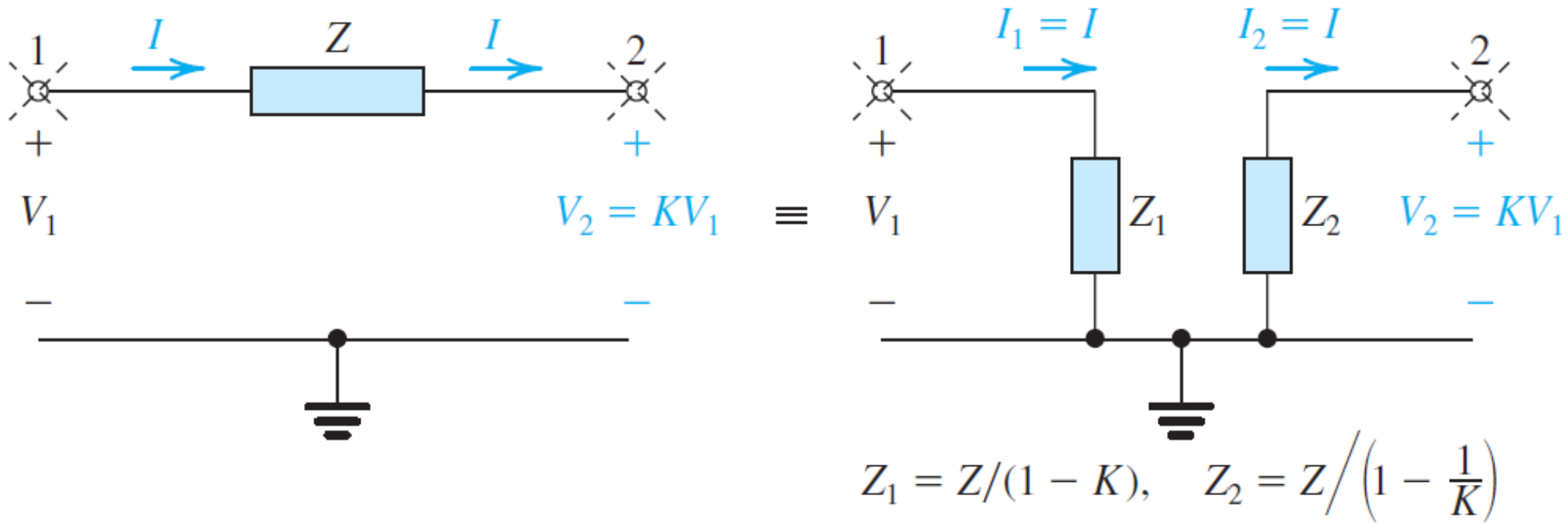
Exercise 1

***8.43** The NMOS transistor in the circuit of Fig. P8.43 has $V_t = 0.5$ V, $k_n' W/L = 2$ mA/V^2, and $V_A = 20$ V.

- Find V_{GS}, V_{DS}.
- Find voltage gain.
- What is the largest input sine wave to keep the NMOS in sat?
- Find R_{in}.
- Can we use Miller effect to simplify calculations?

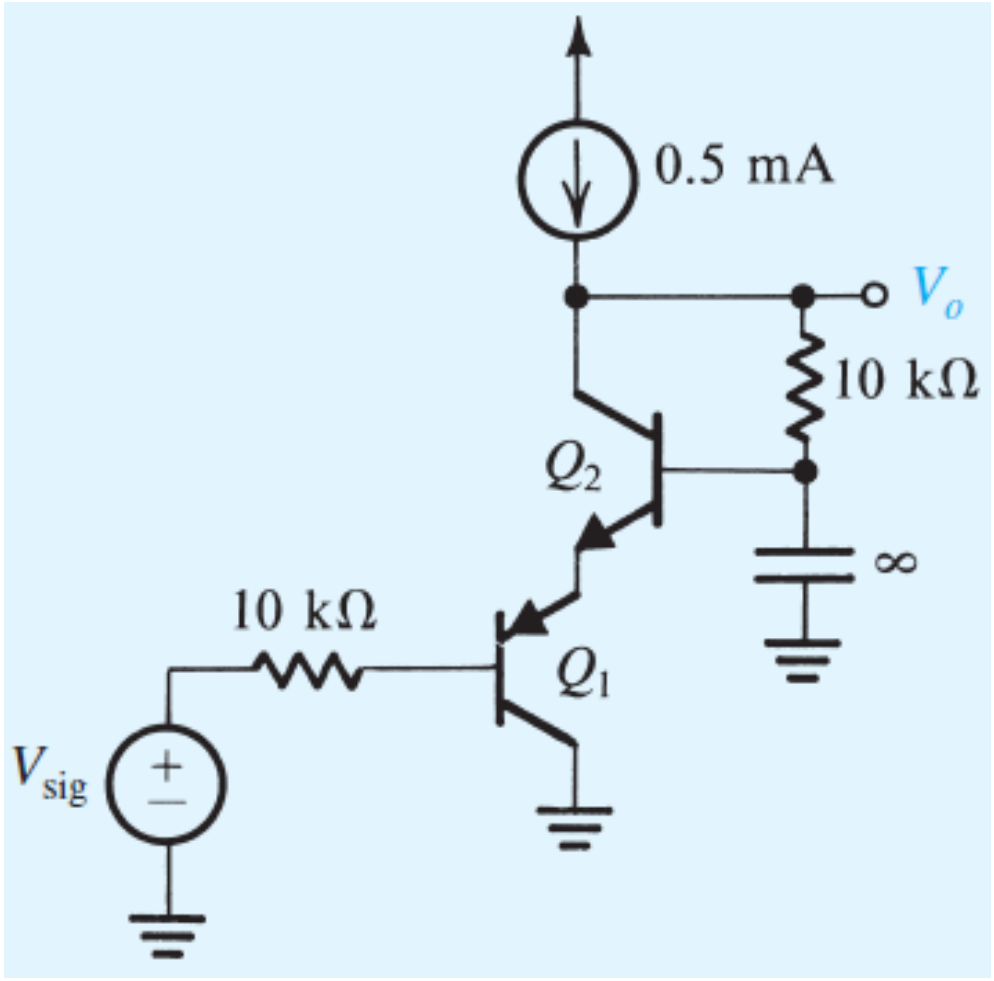


Miller Effect



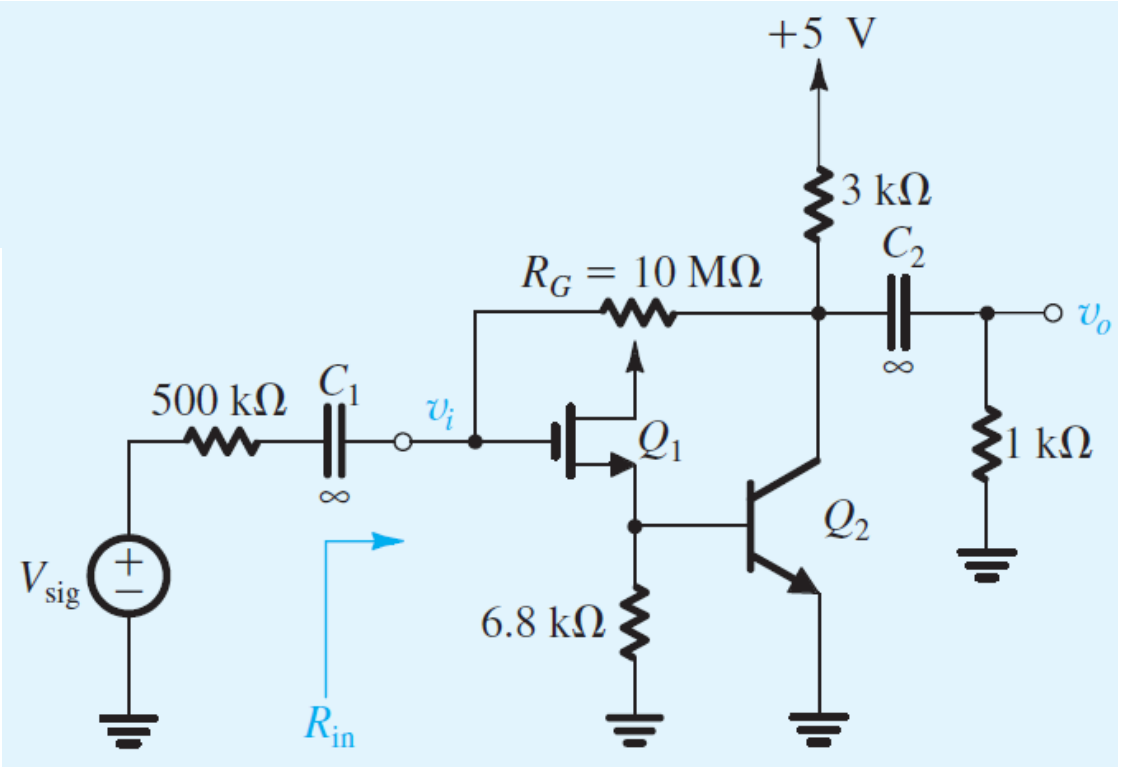
Exercise 2

- What is the voltage gain? (β=100)



Exercise 3

D *8.97 Consider the BiCMOS amplifier shown in Fig. P8.97. The BJT has $V_{BE} = 0.7$ V and $\beta = 200$. The MOSFET has $V_t = 1$ V and $k_n = 2$ mA/V^2. Neglect the Early effect in both devices.



- Find I_1, I_2.
- Calculate small signal parameters.
- What is the gain v_o/v_i?
- What is the gain v_o/v_{sig}?

Exercise 4

Unless otherwise specified, use $\beta_F = 100$, $V_A = 70$ V, $K_p = K_n = 1$ mA/V^2, $V_{TN} = -V_{TP} = 1$ V, and $\lambda = 0.02$ V^{-1}.

- Calculate the amplifier gain, f_H, f_L.