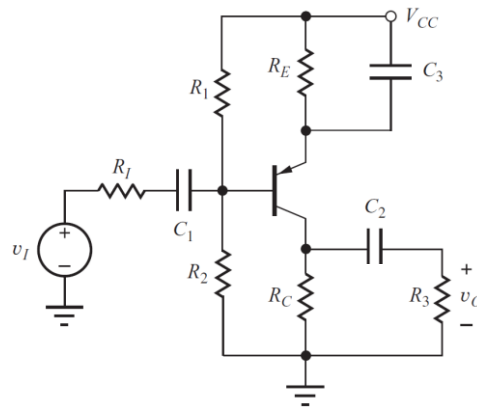


Due: 16 October 2019 @8:40 am – **No late homework will be accepted.**

- 1) Consider the amplifier below. Assume that C_1 and C_2 are coupling capacitors, and C_3 is a by-pass capacitor. Assume that $V_A < \infty$.
 - a. Using the short-circuit time constant method; find an expression for the lower corner frequency (-3 dB frequency).
 - b. Find the mid-band voltage gain expression.
 - c. Using the Miller approximation, derive the expressions for the high frequency poles. Consider C_π and C_μ of the transistor.



- 2) Due to a manufacturing error, a parasitic resistance has appeared in series with the source of M_1 in Fig. 1a. Assuming $\lambda > 0$ and neglecting other capacitances, determine the input and output poles of the circuit.

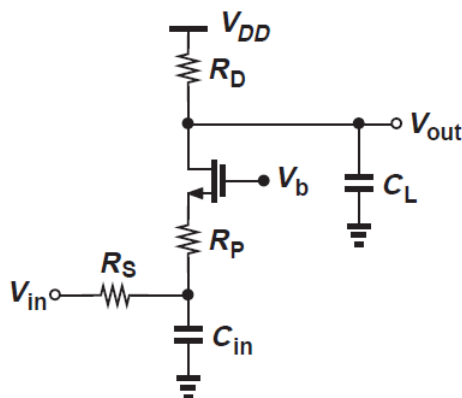


Fig 1a. Figure of Question 3

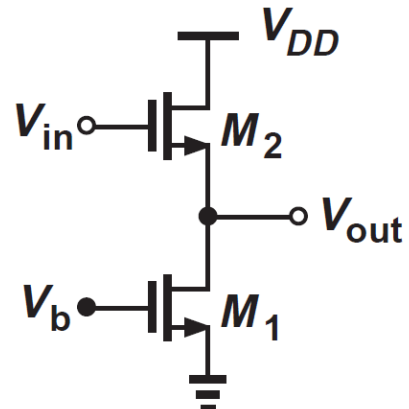


Fig 1b. Figure of Question 4

- 3) By using the open-circuit time constant method, determine the upper corner frequency (-3 dB frequency) of the amplifier in Fig 1b. Assume that $\lambda > 0$.
- 4) The amplifier below must drive a load capacitance of 200 fF. Use 2N2222 npn transistor in LTSpice. No need for hand calculations, please provide just the outcomes of LTSPICE/PSPICE simulations.
 - a. Select the input DC level to obtain an output DC level of 1.3 V.
 - b. Plot the frequency response and find the low-frequency gain and the -3 dB bandwidth from the simulation results.

