

ECE 323

Homework 4

1. Sketch the magnitude and phase response of the following transfer functions.

(a) $H(s) = \frac{1000}{\left(1 + \frac{s}{10}\right)}$

(b) $H(s) = \frac{100}{s}$

(c) $H(s) = \frac{10000}{s(s+10)}$

(d) $H(s) = \frac{10000}{\left(1 + \frac{s}{100}\right)\left(1 + \frac{s}{10^4}\right)}$

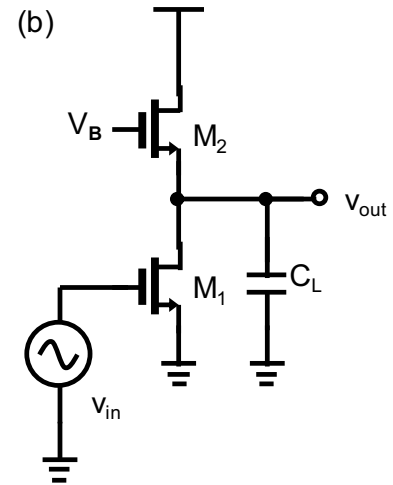
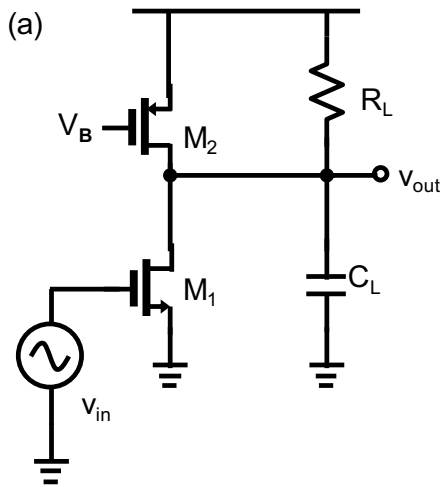
$$(e) \quad H(s) = \frac{400}{s^2}$$

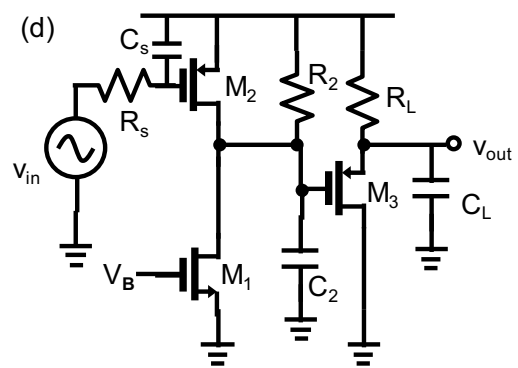
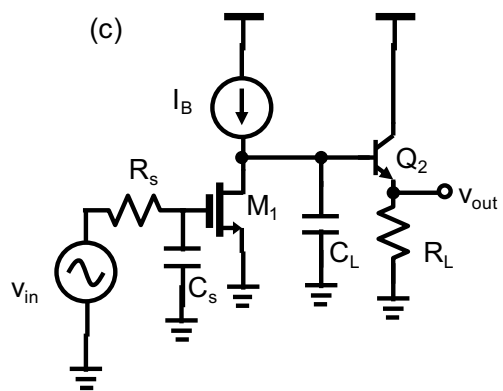
$$(f) \quad H(s) = \frac{200 \left(1 + \frac{s}{10} \right)}{\left(1 + \frac{s}{10^3} \right)}$$

$$(g) \quad H(s) = \frac{10^4 \left(1 + \frac{s}{10^4} \right)}{\left(1 + \frac{s}{100} \right) \left(1 + \frac{s}{10^6} \right)}$$

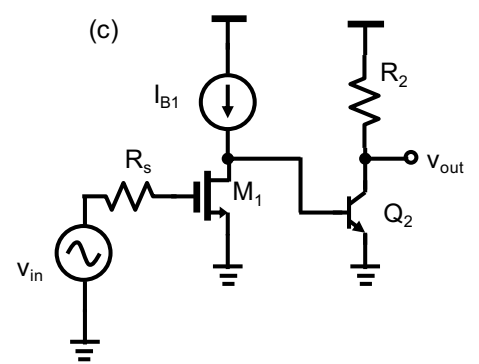
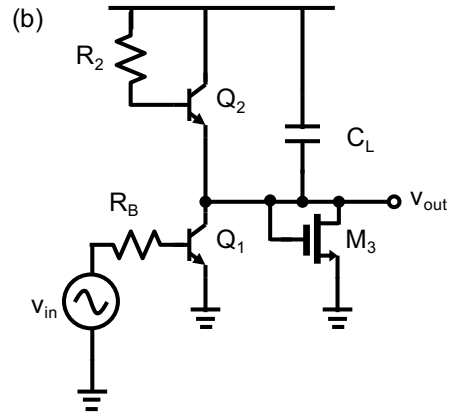
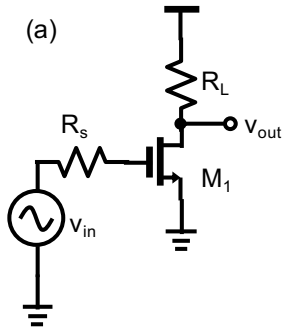
$$(h) \quad H(s) = \frac{\left(1 + \frac{s}{10} \right)}{\left(1 + \frac{s}{10^3} \right) \left(1 + \frac{s}{10^5} \right)}$$

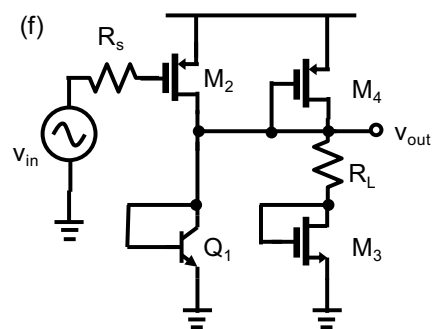
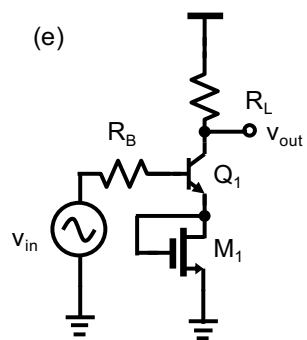
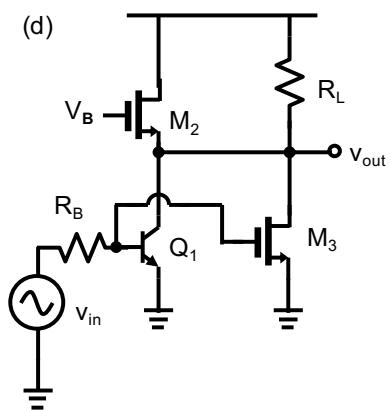
2. Find the input to output transfer function $H(s)$. In other words, find the low frequency small signal gain and poles. Ignore all intrinsic capacitances. Assume $r_o = \infty$.



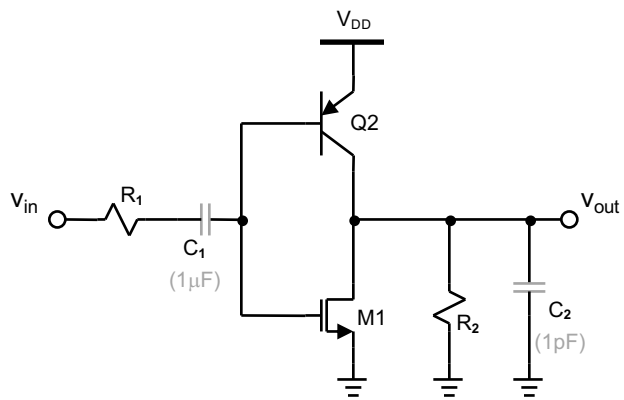


3. Find the approximate -3dB bandwidth (corner frequency) for each of the following circuits using zero-value time constant analysis. Include intrinsic capacitances and assume $r_o = \infty$.





4. Find the input-to-output transfer function $H(s)$.



5. Find the “upper 3dB frequency” ω_H (considering the intrinsic capacitances).

