Instructions, notes, and hints:

Provide the details of all solutions, including important intermediate steps. You will not receive credit if you do not show your work.

Some problems might be solvable (or must be solved) using good engineering approximations or assumptions. In those cases, your answer might differ from the posted answer by a fairly large margin. Given typical device variations and component tolerances, that amount of discrepancy is often reasonable. If you justify any approximations you make, you will be given full credit for such answers.

Prob. 8.17: The common-mode and differential-mode input voltages can be modeled as shown in below.

Prob. 8.24: Because MOSFETs $Q_4$ and $Q_5$ serve as loads instead of resistors, the output resistances of $Q_1$ and $Q_2$ $(r_{o1}$ and $r_{o2})$ must be taken into account in the gain formula as well as the output resistances of one or more of the other MOSFETs. This is because the equivalent resistances of $Q_4$ and $Q_5$ are not way less than $r_{o1}$ and $r_{o2}$. You may assume that the small-signal node voltage at the source terminals of $Q_1$ and $Q_2$ is very close to signal ground (i.e., the small-signal drain-to-source voltage of the current mirror FET $Q_3$ is very small).

Prob. 8.30: For part b, assume that both drain resistors had values of exactly 5 kΩ (i.e., no mismatch) when the measurement was made.

Assignment:

Problems 8.17, 8.24, and 8.30 in the textbook.