

ECE4902 Lecture 8

Differential Pair

Current Source Bias

Analysis Example

Diff Pair with Active Load

2-Stage Op-Amp

Online: HW 4

(due *December 1!*

Happy Thanksgiving!)

Handout:

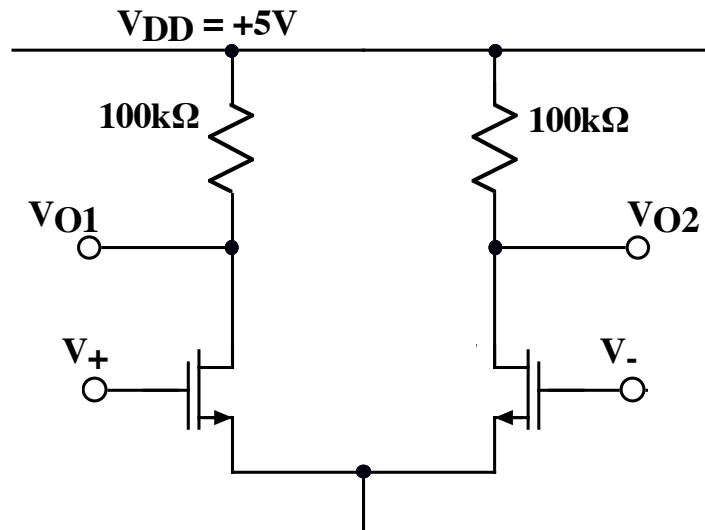
Lecture 8 Topics

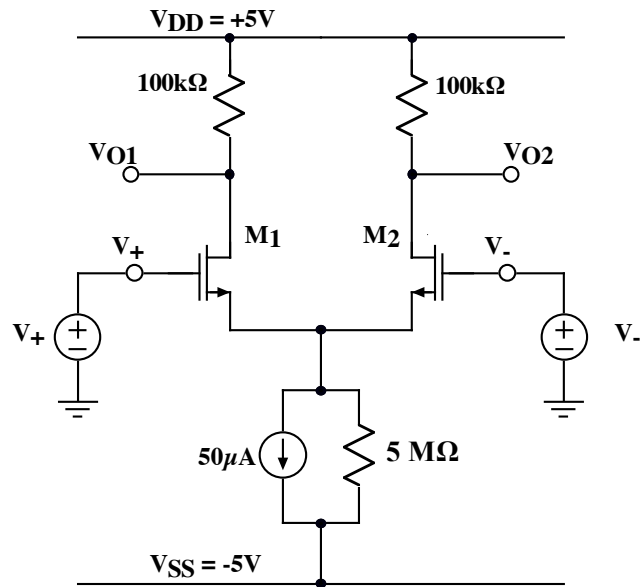
Analysis Example

Active Load Development

2-Stage Op-Amp Development

Lab 8/9 Op-amp

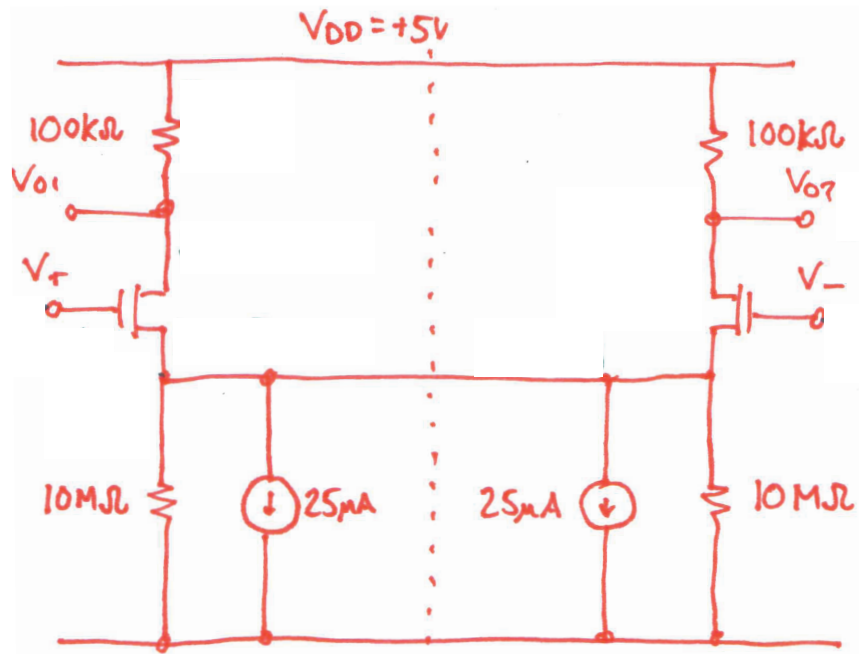




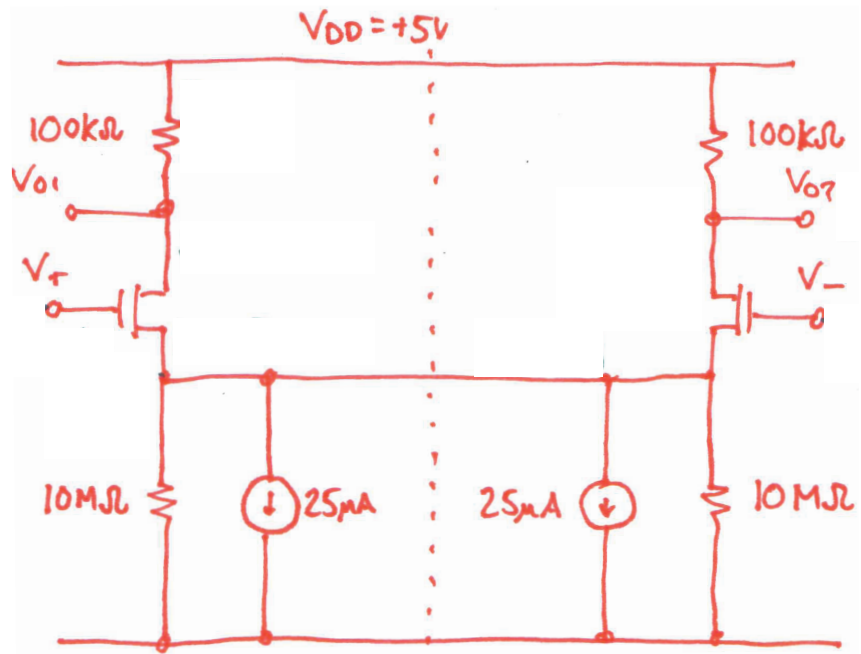
- Find the DC operating point for the circuit (device currents and DC node voltages)
- Draw the half-circuit representations for the common mode and differential mode circuits.
- Determine the common mode and differential mode gains
- Sketch the total output waveforms V_{O1} and V_{O2} for a purely differential input of a 10mV peak sine wave.
- Sketch the total output waveforms V_{O1} and V_{O2} for a common mode input of a 1V peak sine wave.

For M1, M2: $\frac{\mu C_{ox}}{2} \frac{W}{L} = 3.0E-4 \frac{A}{V^2}$

Differential mode



Common mode



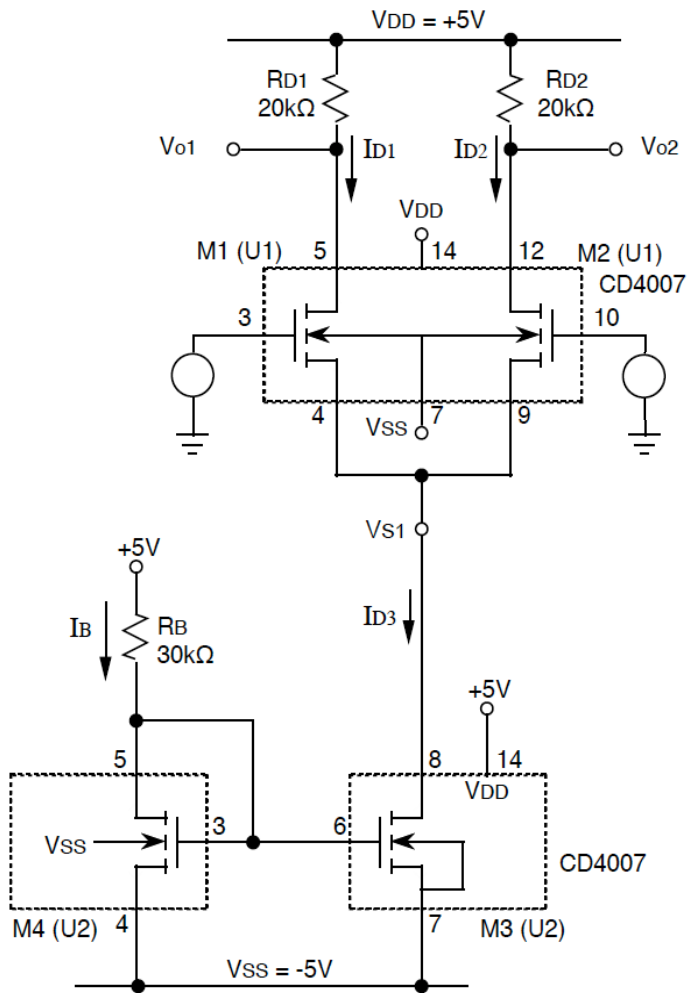
Outputs: Differential mode

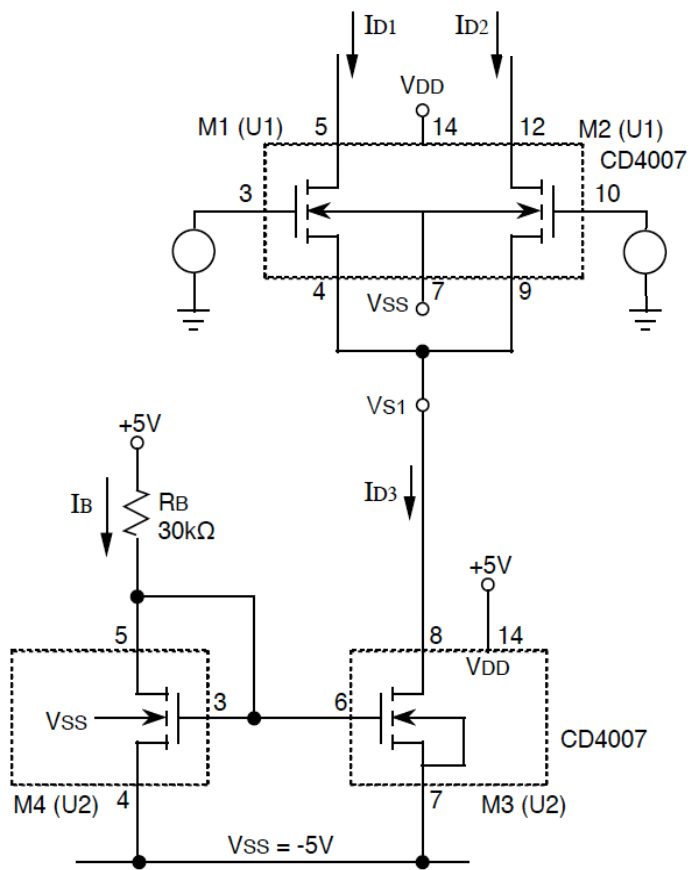


Outputs: Common mode



Op-amp requirements for differential amplifier





Lab 8 op-amp:

