Reverse Classroom: Op Amps Quiz 2

REV 0; August 18, 2019

1 Golden Rules vs. the Diff-Amp View of an Op Amp

Now you know that an op amp is "simply" a very good difference amp: one with

- lots of gain;
- high R_{in};
- low R_{out}

If we extrapolate these parameters to their most favorable limit, we get the:

Perfect Op Amp Design Rules

1. No current flows into or out of the inputs (V_- and V_+) of an op amp.
2. If there is negative feedback, the op amp keeps the negative input at the same voltage as the positive input, so you can assume that V_- = V_+.
3. The inputs of an op amp should always be kept between V_{CC} and V_{EE} (i.e., $V_{EE} \leq V_-, V_+ \leq V_{CC}$).
4. The output of an op amp cannot be greater than V_{CC} or less than V_{EE}.

1.1 Design

Apply the Golden Rules to design a non-inverting amp using an LF411 op amp. Use standard value resistors. Here are the specifications:

- gain of ≈ 100
- R_{out} for the signal source is unknown
- use supplies of $\pm$15V

1.2 Amplifier Input Impedance

What is the input impedance of your amplifier according to the golden rules?

1.3 Amplifier Output Impedance

What is the approximate output impedance of your amplifier?

1.4 . . . analyzed according to the golden rules. . .

According to the golden rules, what is the voltage difference between the two op amp terminals, marked "+" and "-"? (Assume an input signal of 0.1V)

1.5 . . . analyzed according to your understanding of differential amplifiers. . .

Let's assume that the op amp's open-loop gain, A, is 10,000 (as it is, at some particular frequency).

According to your understanding of differential amplifiers, what is the voltage difference between the two terminals, marked "+" and "-", if your design of §1.1 is fed an input signal of 0.1V?

Now complete Lab 6 through part 6L.4