EE 332 Circuits and Devices II Autumn 2022

Homework 9 Due: Dec. 11 (11:59pm)

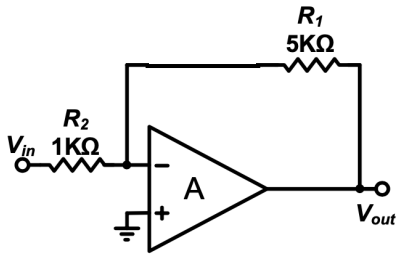
1. You are given the op amp-based amplifier circuit shown below.

a. Assuming the op amp is ideal, derive the expression and find a numerical value for the closed-loop gain of the circuit.

b. Now assume the op amp has a gain of 60dB (A=1000), -3dB bandwidth of 10MHz, infinite input resistance, and output resistance of 100Ω. Find numerical values for the closed-loop gain and closed-loop frequency response of the circuit.

c. What is the fractional error in closed-loop gain caused by the non-infinite gain of the amplifier?

d. Find the output impedance assuming the feedback network doesn't have any loading effects at the output.



2. Consider a single-pole op-amp with a dc gain of A_0, and with its pole at $\omega_p=\omega_0$. The input and output impedances of the op amp are large and small enough, respectively, to be negligible. Using this op amp, we construct the feedback systems shown below.

For each system, find the transfer function $V_{out}(s)/V_{in}(s)$ and sketch the Bode plot (only magnitude). Label all gain, pole/zero locations, and slopes.