ECE 3043
Homework Assignment No. 5

Spring 2019 Homework 5 for Experiment No. 6
Due Week of February 18

1. Design an inverting bandpass op amp amplifier/filter (Figure 1) with a midband voltage gain with a magnitude of 10, a lower $-3$db frequency of 100 Hz, and an upper $-3$db frequency of 20 kHz. The circuit shown in Fig. 1 is suggested. Pick the capacitor $C_1 = 0.1 \mu F$ and compute the other components. Perform an ac analysis with LTSpice and Multisim to plot the magnitude of the voltage gain as a function of frequency as the frequency ranges from one tenth of the lower critical frequency to ten times the highest. Assume that the op amp is ideal. Also, plot the Bode plots with both Matlab and Mathcad.

2. Design an op amp noninverting high pass shelving amplifier/filter (Figure 2). The dc gain is to be 1, the infinite frequency gain 10, and the pole frequency 20 kHz. The circuit shown in Fig. 2 is suggested. Pick $C_1 = 0.01 \mu F$ and solve for the other circuit components. Perform the same analyses as for the circuit in Problem 1.