

303H Fall 2014 – Homework 6 Due Th 10/16/14

1. (35 points, op-amp frequency response)

In Spice do a frequency response for the transfer function which is the open circuit voltage gain of an op-amp for two different op-amps, the AD741 and the LM324, both of which are in the PSpice opamp library. Use an input VAC and run from 10 Hz to 1GHerz on a log frequency scale and db magnitude. This can be done from one VAC so that the two op-amps can be compared in one AC run. From the results give the first order pole model for their transfer functions, $T(s)=V_{out}/V_{in}(s)=\omega_o K_o/(s+\omega_o)$. Compare the results for the two different op-amps. Discuss how to find a two pole model

$$T(s)=\omega_o\omega_1 K_o/[(s+\omega_o)(s+\omega_1)]$$

2. (65 points, degree 2 max flat filter design)

Design a degree 2 maximally flat magnitude low pass filter using one TI UAF42 for $f_o=\omega_o/2\pi=10\text{KHz}$ and $Q=40$. Simulate this in PSpice using AD741 op-amps and compare the result with what is expected by the theoretical maximally flat (=Butterworth) design.