ECE 321 - Homework #4

Butterworth & Chebychev filters, Analog Computers. Due Monday, April 27th

Butterworth and Chebychev Filters

1) Design a filter, G(s), to meet the following specifications:

Input:

- 20 - 1 kHz audio signal
- 10Vpp, capable of driving 10mA @ 5V

Output:

- 20 - 1 kHz audio signal
- Capable of driving 10mA @ 5V

Relationship:

- 0.9 < Gain < 1.1   0 < w < 250 Hz
- Gain < 0.1   w > 400 Hz

Plot your filter's gain vs. frequency using Matlab (or similar program)

2) Design an op-amp circuit to implement your filter from problem #1

3) Verify your design in CircuitLab
- Check the gain at the design points (250Hz and 400Hz)
- Check the gain at two other points (100Hz and 1000Hz)

Analog Computers

4) Design an analog computer to implement

$$Y = \left(\frac{10(s^2+9)}{(s+2)\left(s^2+2s+4\right)} \right) X$$