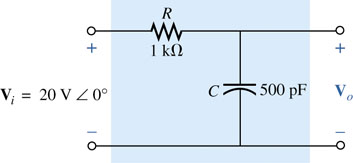
**ELCT222 HW3**

**Matlab and Introduction to Frequency Response**

1. Consider the following circuit:



1. Using the sample code provided, plot the gain Vo/Vi as a function of frequency in MATLAB. Use MATLAB to label the axes clearly. (30)
2. Now re-plot the same graph, but with log-axes. Do the axes go to 0? Where do they start from? Relate this to what you read in Chapter 21.1.(10)
3. Replot this same graph, but the y axis being 20log10(Vo/Vi) plotted on a linear axis and the x-axis plotted as is on a linear axis. This seems rather strange, but the 20log10(Vo/Vi) is called the **decibel (dB)** unit of gain. This is what you use when describing your audio amplifier gain. It tells you that your ear responds only to exponential changes in volume. (10)
4. What is the gain at high frequencies? Open circuit or short circuit? (5)
5. What is the gain at low frequencies? Open circuit or short circuit? (5)
6. At what frequency is the gain ~0.7? Compare this to 1/RC. Comment. You can use the MATLAB cursor function in the plot window to read this off easily.(10)
7. Now plot the phase of the output as a function of frequency. You can do this by using the angle(gain) function in Matlab. This will automatically give you the phase of any complex array in RADIANS!!!!. Make sure. the x-axis is logarithmic, while the y-axis is in units of **degrees**. (30).

%When you first save this in MATLAB, remember to set the path to this file.

%Go to File->Set Path->Add folder. This tells Matlab where to find your

%code.

w=[0:0.01:100];

%w=1; % Which version of w do you want to use?

%t=[0:0.001:10];% time in seconds

%Vi=exp(1i.\*t); %Vi in volts. Is this what you need for HW5?

C=; %capacitance in Farads

R=; %Resistance in Ohms

ZC=1./(1i.\*w.\*C);

ZR=R;

gain=ZC./(ZC+ZR);

Vo=Vi.\*gain;

plot(w, angle(gain)); %What am i plotting here?

plot(w, abs(Vo)); % what am I plotting here?