LTspice worksheet III

1. ".ac" is a useful analysis to understand the frequency dependence of devices or circuits. Type of sweep/List is used for analysis at specific frequencies; type of sweep/decade is used for Bode plot like sweeping. Usually we use AC source with amplitude 1 and phase 0 here.

2. The phasor analysis and also a Bode plot for an RC circuit will be demonstrated in class. The schematic of an RC circuit is in the following figure:

   If you check the Netlist file, you will see:


```
C1 OUT 0 1µ
R1 IN OUT 1k  (order of the nodes is essential)
V1 IN 0 AC 1
.ac list 100
.backanno
.end
```
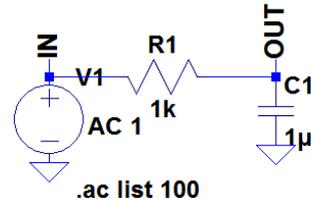
3. The result of the AC analysis at f=100 Hz is listed here:

```
frequency:      100              Hz

V(out):       mag:   0.846733 phase:   -32.1419°              voltage

V(in):        mag:        1  phase:         0°              voltage

I(C1):        mag: 0.000532018 phase:    57.8581° device_current

I(R1):        mag: 0.000532018 phase:    57.8581° device_current

I(V1):        mag: 0.000532018 phase:  -122.142° device_current
```

(The phase value depends on the order of the nodes in the Netlist.)

4. To find the impedance of the RC circuit, it is easier to use an AC current source.

5. Plot the Bode plot for this 1st-order low-pass network. Check the roll-off slope if it is -20dB/dec.

6. Upload your file to the iLearning platform

   Please put everything you need to present in a Word and convert to a PDF file. Please email the **pdf file** only. The size of the file should be less than 2M. The file name should be "Group?-Date", (ex. Group17-20180315). Please also mark the members who are absent.

In-class group project III (20180315)

1. Plot the impedance (amplitude and phase angle <u>in linear scale</u>) between 1 and 100kHz of a 1st-order high-pass network as follows:
   Find the slope of roll-off.
   Note: use current source.
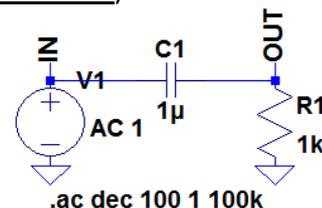
2. Work out the Bode plot for V(OUT)/V(IN) this circuit for the frequency range from 1 to 100 kHz. (f axis in log scale)