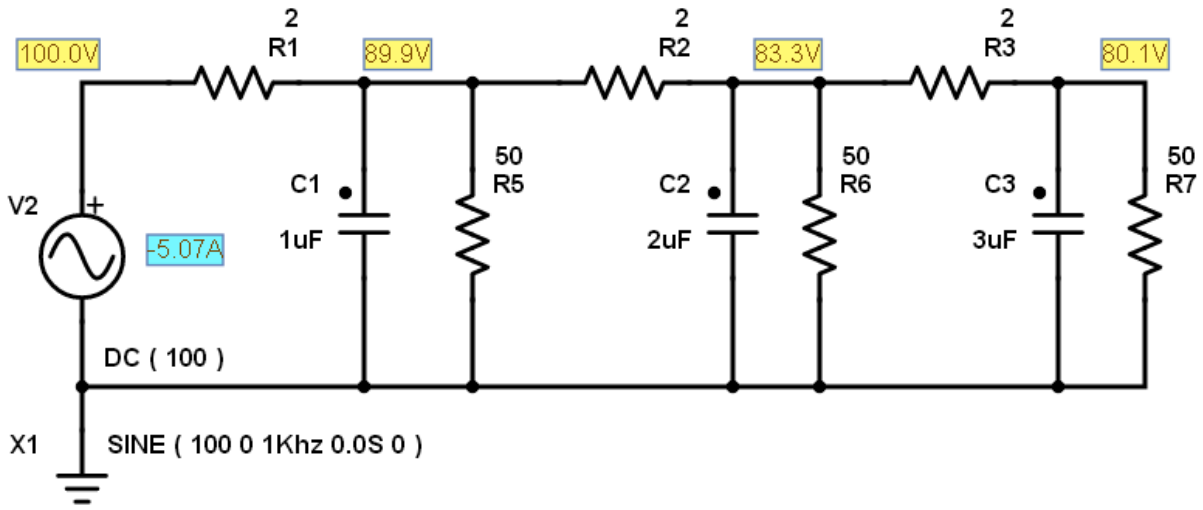
EE 206: Solution #1

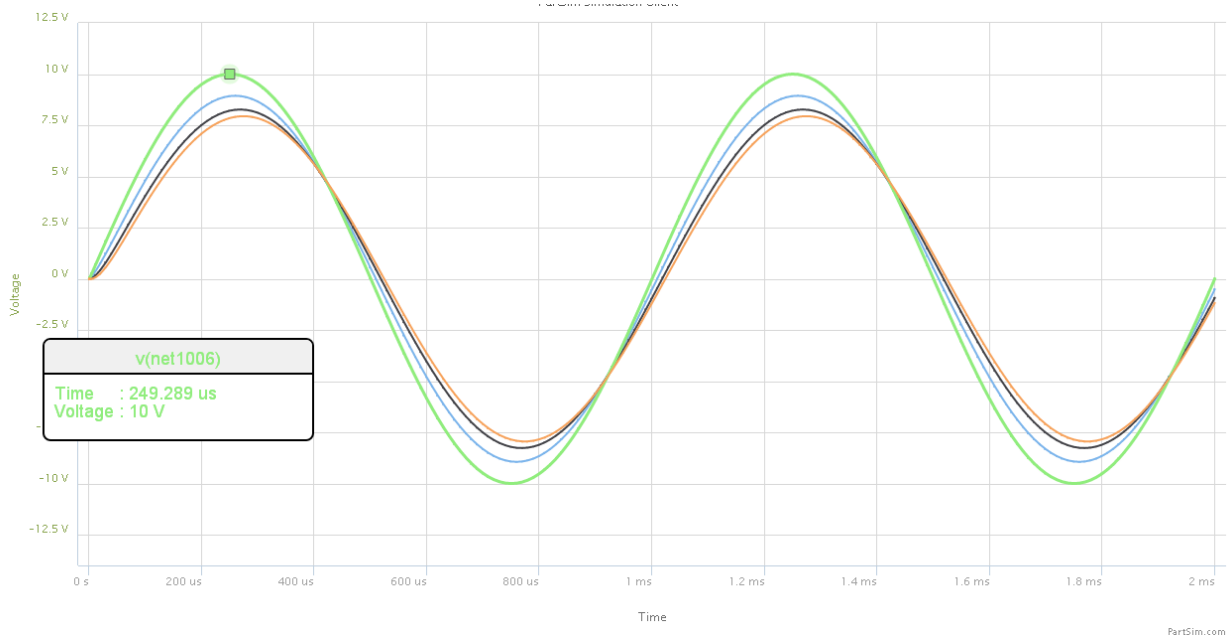
PartSim and Matlab: Due Monday, January 14th, 2019

PartSim

1) For the following circuit, let Vo = 100V. Using PartSim, determine the voltages V1 .. V3. (note: use Run - DC Bias)



2) Assume Vo is a 10V peak, 1kHz sine wave. Determine V1 .. V3 using PartSim



Vo (green), V1 (blue), V2 (black), V3 (orange)

Note that for AC signals, the output has achange in amplitude, and a time delay.

Matlab

3) Using Matab, solve for V_1, V_2, and V_3

$$10V_1 + 20V_2 + 30V_3 = 50$$

$$5V_1 - 8V_2 + 24V_3 = 6$$

$$V_1 + V_2 - V_3 = 0$$

Place in matrix form

$$\begin{bmatrix} 10 & 20 & 30 \\ 5 & -8 & 24 \\ 1 & 1 & -1 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} 50 \\ 6 \\ 0 \end{bmatrix}$$

Solve

```
A = [10,20,30 ; 5,-8,24 ; 1,1,-1]

    10    20    30
     5    -8    24
     1     1    -1

B = [50;6;0]

    50
     6
     0

V = inv(A)*B

V1   -0.6173
V2    1.4938
V3    0.8765
```

4) Using Matab, solve for V_1, V_2, and V_3

$(10+j3)V_1 + 20V_2 + 30V_3 = 50$

$5V_1 - 8V_2 + (24-j10)V_3 = 6 + j10$

$V_1 + V_2 - jV_3 = 0$

Place in matrix form

$$\begin{bmatrix} 10+j3 & 20 & 30 \\ 5 & -8 & 24-j10 \\ 1 & 1 & -j \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} 50 \\ 6+j10 \\ 0 \end{bmatrix}$$

```
A = [10+j*3,20,30 ; 5,-8,24-j*10 ; 1,1,-j]

  10.0000 + 3.0000i  20.0000           30.0000
   5.0000            -8.0000           24.0000 -10.0000i
   1.0000             1.0000                 0 - 1.0000i

B = [50 ; 6+j*10 ; 0]

  50.0000
   6.0000 +10.0000i
        0

V = inv(A)*B
```

V1 -2.0858 + 2.3206i
V2 1.9613 - 1.0342i
V3 1.2865 + 0.1245i