

ECE 202 (Fall 2007)
Homework No. 2
Due: Friday, 09/07/2007

(P.1) [20 pts.] A sinusoidal voltage signal, $v(t)$, has the form:

$$v(t) = V_m \cos(2\pi ft + \phi) \text{ V}$$

The signal has a period of $T = 5 \mu\text{s}$. At $t = 0$ the amplitude is -31.42 V . The signal waveform reaches its first positive peak after $t = 0$ at $t = 3 \mu\text{s}$.

- a) Sketch the signal, $v(t)$, by hand and indicate all pertinent information accordingly. (8 pts)
- b) What is the signal frequency, f , in hertz? (2 pt)
- c) If ϕ is positive, towards which direction has the signal been shifted? (1 pt)
- d) Based on your answer to c), what is the phase angle, ϕ , in degrees? (7 pts)
- e) What is the amplitude, V_A , of the signal? (2 pt)

(P.2) [15 pts.] For the following two sinusoidal signals:

$$v_1(t) = -10 \cos(\omega t + 50^\circ) \text{ V}$$

$$v_2(t) = 12 \sin(\omega t - 10^\circ) \text{ V}$$

- a) Convert the signals into phasors (6 pts)
- b) Find the angle between the signals using phasors. (2 pts)
- c) Sketch the angle between the signals graphically using phasors (6 pts)
- d) Indicate which signal is leading (i.e., has a larger angle measured counter-clockwise from the positive "Re" axis). (1 pt)

(P.3) [15 pts.] Using the phasor approach, determine the steady-state current, $i(t)$, in a circuit described by the equation

$$4i(t) + 8 \int i(t) dt - 3 \frac{di(t)}{dt} = 50 \cos(4t + 75^\circ)$$