

This problem refers to Example 1 in the “AC-the hard way” lecture notes. Use the results given in the notes to find:

- a. Use the results given in the notes to find the current in the circuit. (This will be a sinusoidal function of time.)

$$i(t) = \underline{\hspace{15cm}}$$

- b. Find the resistor voltage. (Also a function of time.)

$$v_R(t) = \underline{\hspace{15cm}}$$

- c. Show that the resistor and capacitor voltages add to give the source voltage. (Might require some trigonometric gymnastics.) (Indicate clearly where this bit of work is in your solution below.)

- d. Make the following changes:  $R = 500 \Omega$ ,  $C = 10 \text{ nF}$ ,  $\omega = 10^5 \text{ rad/s}$ , and  $V_m = 2 \text{ V}$ . Calculate the new values of  $A$ ,  $B$ ,  $\tau$ ,  $M$ , and  $\theta$ .

$$A = \underline{\hspace{10cm}} \quad B = \underline{\hspace{10cm}}$$

$$M = \underline{\hspace{10cm}} \quad \theta = \underline{\hspace{10cm}}$$

$$\tau = \underline{\hspace{10cm}}$$