Important Remarks

- Homework is due on Sept. 24th, 2013 at the beginning of class
- **For all problems, keeping your work in fractions will produce easier, more accurate results.**
- Start early and get help if you need it
- Start a new page per problem
- Show all the work
- Specify all the units
- Circle your answers
- Staple pages

The circuit shown in Figure 1 will be used for problems 1 and 2.

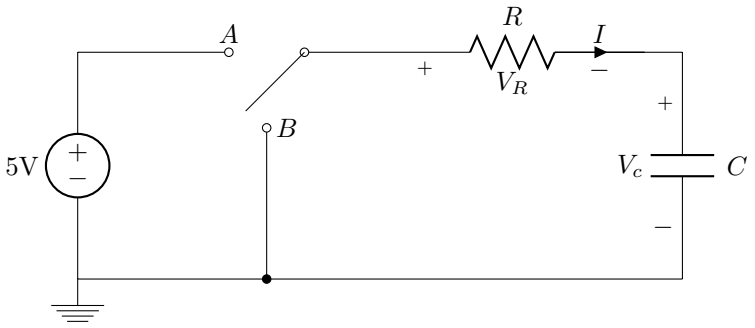

Figure 1:

1. In a simple RC circuit shown in the diagram above, the switch has been in position B for a long time and switches to A at $t = 0$. We observe a capacitor charging with the standard exponential growth curve. At $t = 37.5$ms we measure the resistor voltage V_R is 1.115V. Determine the time constant τ for the circuit.

2. For the diagram above, we determine that the time constant τ is 7.00µs. We assume that the switch has been in position A for a long time and moves to position B at $t = 0$. At a particular time after the switch has moved to position B, we observe that $I = -9.1$mA, and $V_c = 0.725$V.

   (a) Determine what time these observations occur.

   (b) Solve for the capacitor value C.

3. For Figure 2, find the indicated values and express the function $v(t)$ in equation form:

   Find: Peak voltage V_p, peak-to-peak voltage V_{pp}, Period T, frequency f, angular frequency ω, time shift t_{max}, and phase angle θ.

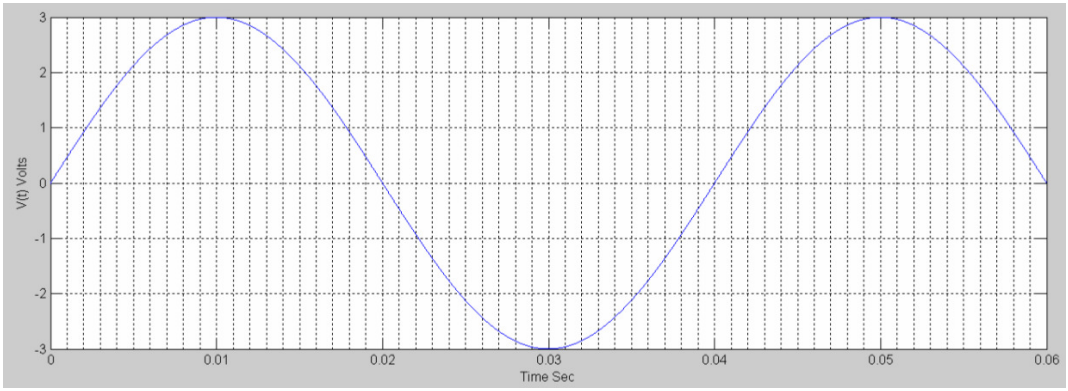

Figure 2:

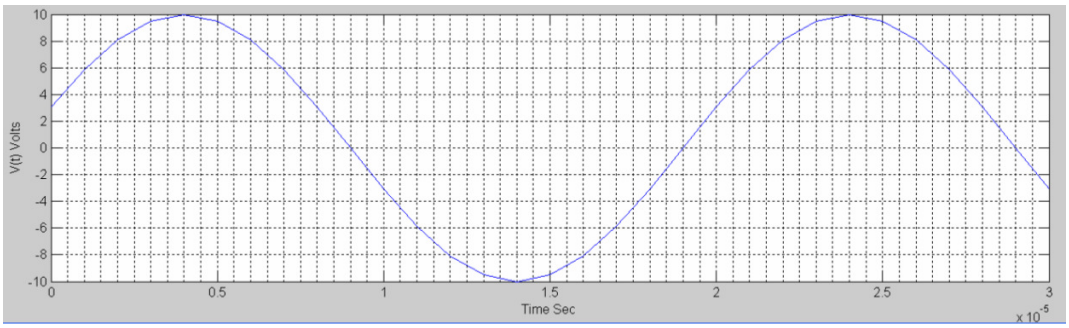

Figure 3:

4. For Figure 3, find the indicated values and express the function $v(t)$ in equation form (be careful to note that the units for time on this graph are in 10^{-5} seconds).

   Find: Peak voltage V_p, peak-to-peak voltage V_{pp}, Period T, frequency f, angular frequency ω, time shift t_{max}, and phase angle θ.

5. For the equation below, find V_p, V_{pp}, T, f, ω, t_{max}, θ; and graph the function for $0 < t < 5/16$ seconds. Remember to label you axes, units, and all relevant points on the graph. Hint: Try to keep your time divisions in terms of fractions rather than decimals, this will be easier to graph. This entire problem is easier without a calculator if you use fractions!

$$v(t) = 25\cos(8\pi t - 30^\circ) \tag{1}$$