ECE 3041 Spring 2012
Homework Assignment No. 5
Homework Problem for Experiment No. 7

Due Week of February 27

1. Determine and plot using both SPICE and Mathcad the current, $i(t)$, as a function of time for the circuit shown below. Also plot the capacitor voltage and current as functions of time (assume the left terminal of the capacitor is positive). The voltage source, $e(t)$, is a symmetric square wave with a peak-to-peak value of 10 V, a dc level of zero, and a frequency of $f = 1\,\text{kHz}$. Take as the origin for the problem an instant of time at which the square wave switches from its lower to its upper level. The range of time for which the plots are to be made is from 0 to 3 ms. As an intermediate step in the solution determine the initial value of the capacitor voltage. Verify the SPICE and Mathcad solutions with a hand calculation at the time $t = 0.25\,\text{ms}$. The values of the circuit component are $R_1 = 7.5\,\text{k}\Omega$, $R_2 = 15\,\text{k}\Omega$, $R_3 = 10\,\text{k}\Omega$ $R_4 = 3\,\text{k}\Omega$, $R_5 = 12\,\text{k}\Omega$, and $C = 0.022\,\mu\text{F}$.