

**Homework #4  
Op-Amp Differentiator**

*Due: Tuesday, 30 March (Can be turned in the studio during open shop times or by 5 PM at Prof. Connor's Office, JEC 6002) The solution will be posted on 31 March.*

We have studied the practical Miller integrator circuit in Experiment 9, in which there is a feedback resistor. The practical differentiator circuit also has an additional resistor in series with its input capacitor, since practical voltage sources have an internal impedance ( $50\Omega$  for our function generator). It is this resistance that must be taken into account when we use the differentiator. Analyze the ideal differentiator circuit with an additional resistor in series with the input capacitor to determine the frequency range for which it can be expected to operate correctly. The analysis of the ideal differentiator is on page 111 of Gingrich. Based on your results, select some component values and a source frequency for which the circuit will work as a differentiator. Then simulate your circuit using PSpice to show that it does indeed work.

