



EE 445 – 072

Instructor: Dr. Alaa El-Din Hussein

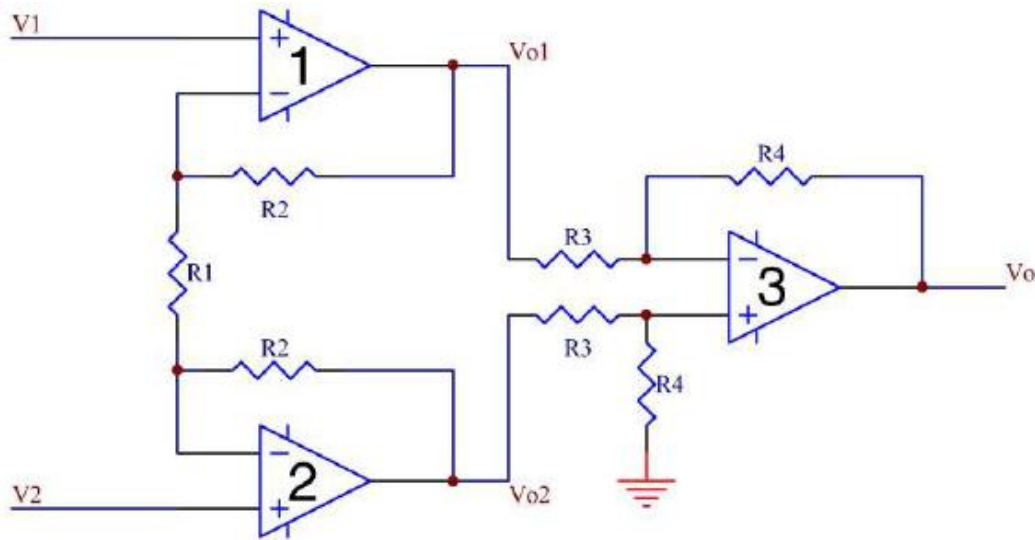
Assignment # 3

Due Date: Saturday April 5, 2008 (in class)

Question 1:

For the shown instrumental amplifier:

- What are the voltage at the inverting terminals of opamps 1 and 2.
- Use those voltages to find the voltages at the output of opamps 1 and 2, V_{o1} and V_{o2} respectively.
- For op amp 3, find V_o in terms of V_{o1} for V_{o2} grounded. What op amp configuration is this?
- For op amp 3, find V_o in terms of V_{o2} for V_{o1} grounded. What opamp configuration does this resemble?
- By superposition, the total output V_o of opamp 3 is the sum of the above two results. Find the complete input/output relationship of opamp 3. Using that relationship and the values of V_{o1} and V_{o2} found above, find V_o in terms of V_1 and V_2 .





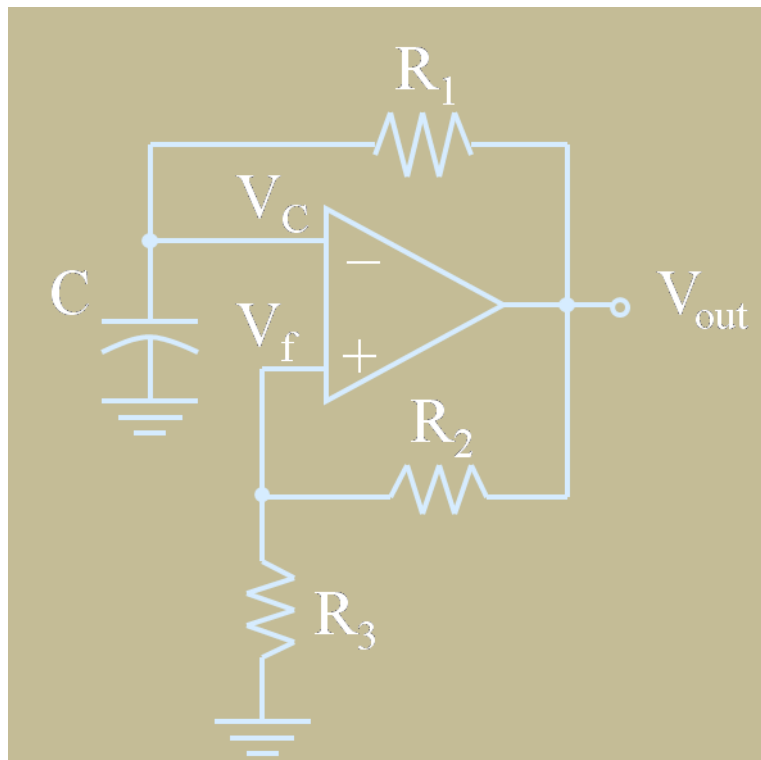
Question 2:

Solve the following differential equation using opamp integrators and adder/subtractor. $\frac{d^2y}{dt^2} + 5\frac{dy}{dt} + 2y = 2\sin(2000\pi t)$ assuming that $y(0)=0$; and

$\left. \frac{dy}{dt} \right|_{t=0} = -1$, and a sinusoidal source of frequency 1KHz is available.

Question 3:

Draw the waveform at V_{out} and V_f , and drive an expression for the frequency of oscillation.



Question 4:

Design a circuit to perform the following operation: $y(t)=3*x(t)^2$