UNIVERSITY of **HOUSTON** | ECE

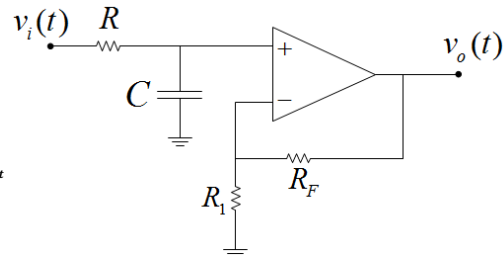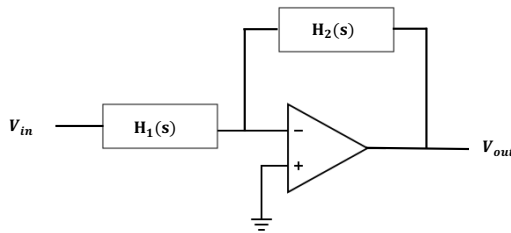**ECE 3337: Signals & Systems Analysis, Class Worksheet 16**

1. (40 points) For the following operational amplifier circuits:

a. (5 points) Indicate whether or not each circuit has dc negative feedback. If not directly clear, indicate the conditions that will guarantee dc negative feedback.

b. (10 points) determine the voltages and currents at the op-amp inputs

c. (10 points) Determine the transfer function $\mathbf{H(s)} = \dfrac{\mathbf{V}_o(\mathbf{s})}{\mathbf{V}_i(\mathbf{s})}$.

d. (15 points) For the input signal $v_i(t) = te^{-t}\sin(t)\,u(t)$ and $R_F = R_1 = R = 1\,\Omega,\quad C = 1\,F$, calculate the **s**-domain output $\mathbf{V}_o(\mathbf{s})$ for the second circuit.

2. (30 points) By combining the basic circuits in Table 4-3 of your textbook, devise an op-amp circuit that performs the following signal calculation:

$$y(t) = -x_1(t) + \frac{dx_2(t)}{dt} + \int_{0-}^{t} x_3(\tau)d\tau$$

3. (30 points) Compute the transfer function $\mathbf{H(s)} = \mathbf{Y(s)}/\mathbf{X(s)}$ for the block diagram below.