3. The schematic diagram below, derive the time-domain gain function, \( v_{out}(t) = f(v_1, v_2) \). State the assumptions that you are making about the op-amp and show the current(s) in the circuit.

4. Given the schematic diagram below, with 2 resistors and 2 capacitors, derive the complex frequency-domain gain, \( G(\omega) = \frac{V_{out}(\omega)}{V_{in}(\omega)} \). What is the function of this circuit?

5. Extra credit (can’t raise your score above 100%): Can you create a band-pass filter sort of like the one above, but using an op-amp, 2 resistors, one capacitor and one inductor? Draw one configuration that you think might work, find its gain function \( G(\omega) \), and state whether it is has the same desirable function as the circuit above.