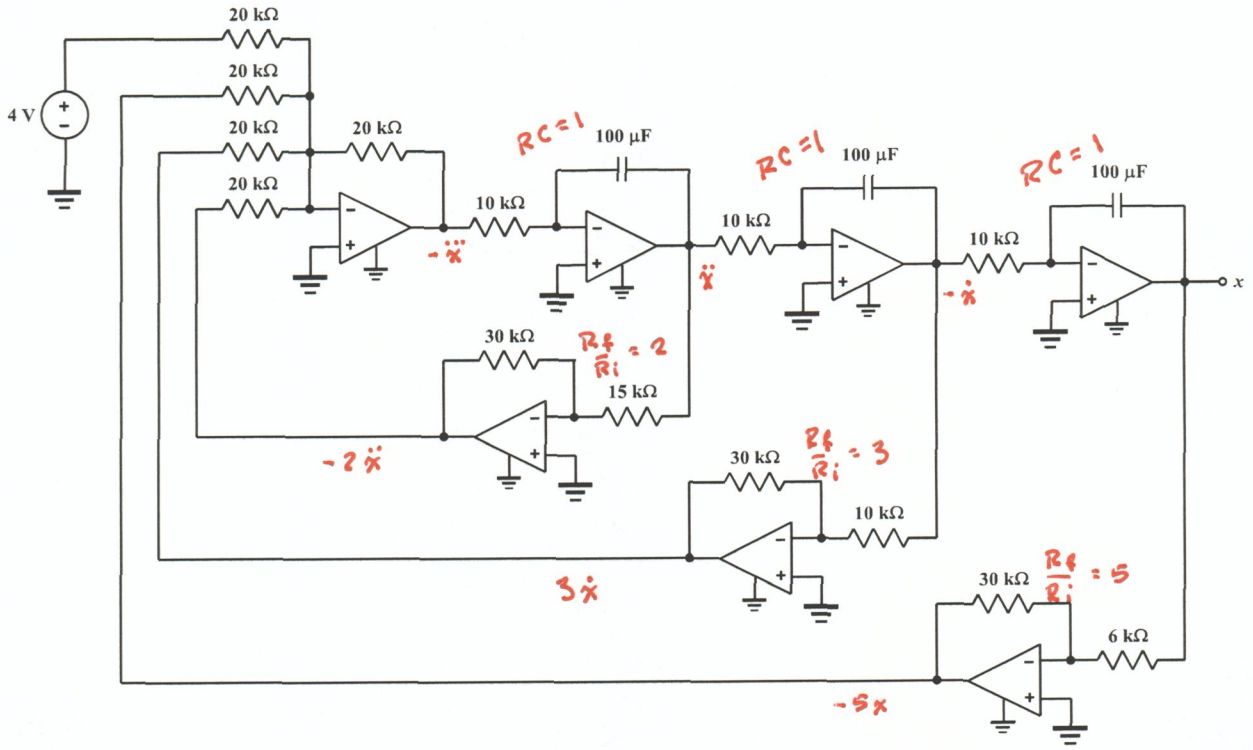
EE 2240

Problem #01

The circuit shown below is a special-purpose analog computer, intended to solve a third-order differential equation of the form:

$$\frac{d^3x}{dt^3} + a\frac{d^2x}{dt^2} + b\frac{dx}{dt} + cx = f(t) \qquad \text{or} \qquad \dddot{x} + a\ddot{x} + b\dot{x} + cx = f(t)$$

Given the component values shown, determine the numerical values of the three coefficients, a, b, and c, and the input, $f(t)$, for the differential equation it was designed to solve.



$$\dddot{x} = -a\ddot{x} - b\dot{x} - cx + f(t)$$

$$= -2\ddot{x} + 3\dot{x} - 5x + 4$$

$$\therefore \quad a = 2, \quad b = -3, \quad c = 5, \quad f(t) = 4$$