Chapter 6, Solution 71.

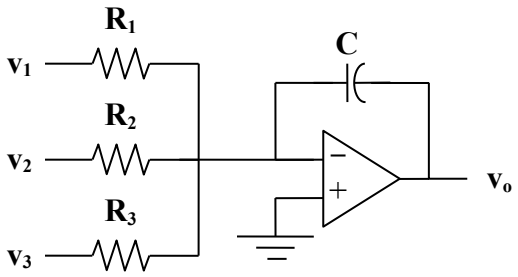
Show how you would use a single op amp to generate

$$v_0 = -\int (v_1 + 4v_2 + 10v_3)\,dt$$

If the integrating capacitor is $\boldsymbol{C} = 2\ \mu$F, obtain other component values.

Solution

By combining a summer with an integrator, we have the circuit below:



$$v_o = -\frac{1}{R_1 C}\int v_1 dt - \frac{1}{R_2 C}\int v_2 dt - \frac{1}{R_2 C}\int v_2 dt$$

For the given problem, C = **2μF**,

$R_1C = 1 \longrightarrow R_1 = 1/(C) = 10^6/(2) =$ **500 kΩ**
$R_2C = 1/(4) \longrightarrow R_2 = 1/(4C) = 500\text{k}\Omega/(4) =$ **125 kΩ**
$R_3C = 1/(10) \longrightarrow R_3 = 1/(10C) =$ **50 kΩ**