7) Integrator Amplifier: (integral Alcı Opamp)

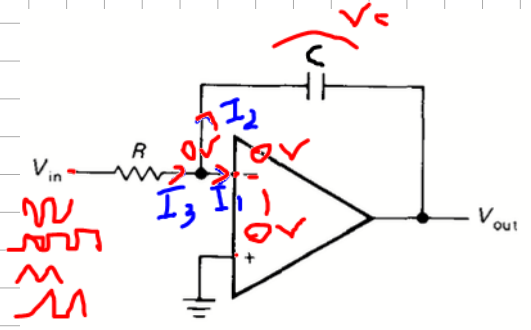

Figure 4.47. Integrator.

$I_3 = I_2 + I_1$

$I_3 = \frac{V_{in}}{R}$

I_1 → ? V

For I_2;

$V_C = \frac{Q}{C}$

$V_C = V_X - V_{out} \Rightarrow V_C = -V_{out}$ (V_X = 0V)

$-\frac{dV_o}{dt} = \frac{1}{C}\frac{dQ}{dt} \Rightarrow -\frac{dV_o}{dt} \times C = \frac{dQ}{dt}$ ($\frac{dQ}{dt} = I_2$)

$\frac{V_{in}}{R} = C \times \frac{-dV_o}{dt}$

$\int \frac{-dV_o}{dt} = \int \frac{V_{in}}{R \times C}$

$$V_o = -\int \frac{V_{in}\,dt}{R \times C}$$

8) Comparator Amplifier: (Karşılaştırıcı Opamp)

If $V_{IN} > V_{REF}$ then $V_{OUT} = +V_{CC}$
If $V_{IN} < V_{REF}$ then $V_{OUT} = -V_{CC}$