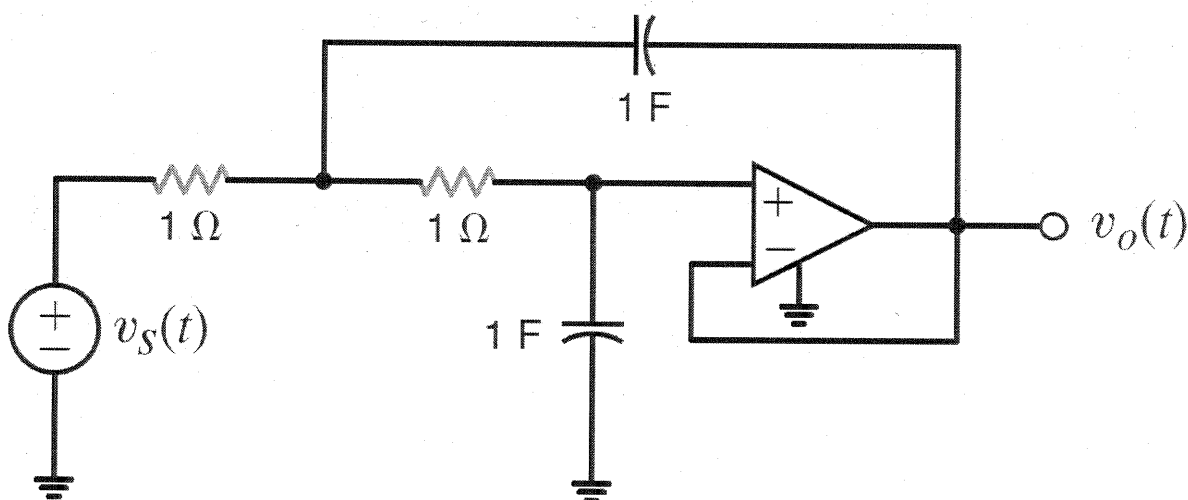
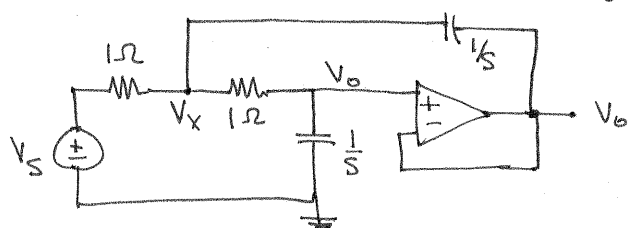


**14.49** Find the transfer function for the network in Fig. P14.49. If a step function is applied to the network, will the response be overdamped, underdamped, or critically damped?



**Figure P14.49**

**SOLUTION:** Op amp is in unity gain configuration.



$$\frac{V_x - V_o}{1} = \frac{V_o}{1/s} \Rightarrow V_x = V_o(s+1)$$

$$\frac{V_s - V_x}{1} = \frac{V_x - V_o}{1} + \frac{V_x - V_o}{1/s}$$

yields  $V_s = V_o(s+1)^2$

$$\frac{V_o}{V_s} = \frac{1}{(s+1)^2}$$

poles are real & identical,  
so,

**CRITICALLY DAMPED!**