

$$V_L(s) = \frac{Z e^{-1000t}}{s} \cdot \frac{S \cdot 100\Omega}{1K + S \cdot 100\Omega} - \left(\frac{-1mA}{s} \right) e^{-1000t} \cdot \frac{S \cdot 100\Omega}{1K + S \cdot 100\Omega}$$

2)

$$V_L(s) = \frac{e^{-1000s}}{s} \left(\frac{2 \cdot s \cdot 100\mu}{1k + s \cdot 100\mu} + \frac{1 \cdot s \cdot 100\mu}{1k + s \cdot 100\mu} \right)$$

$$V_L(s) \cdot e^{1000s} = \frac{3}{s} \left(\frac{s \cdot 100\mu}{1k + s \cdot 100\mu} \right)$$

$$\frac{3}{s} \cdot \left(\frac{s \cdot 100\mu}{s \cdot 100\mu + 1k} \right) = \frac{3}{s} \cdot \left(\frac{8\mu}{s + \frac{1k}{100\mu}} \right)$$

$$= \frac{3}{s + \frac{1}{10^{-7}}}$$

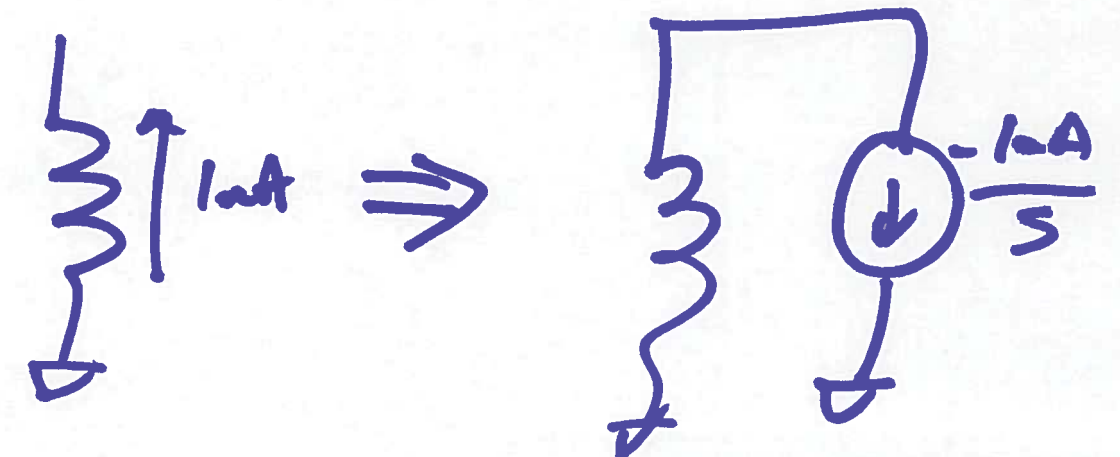
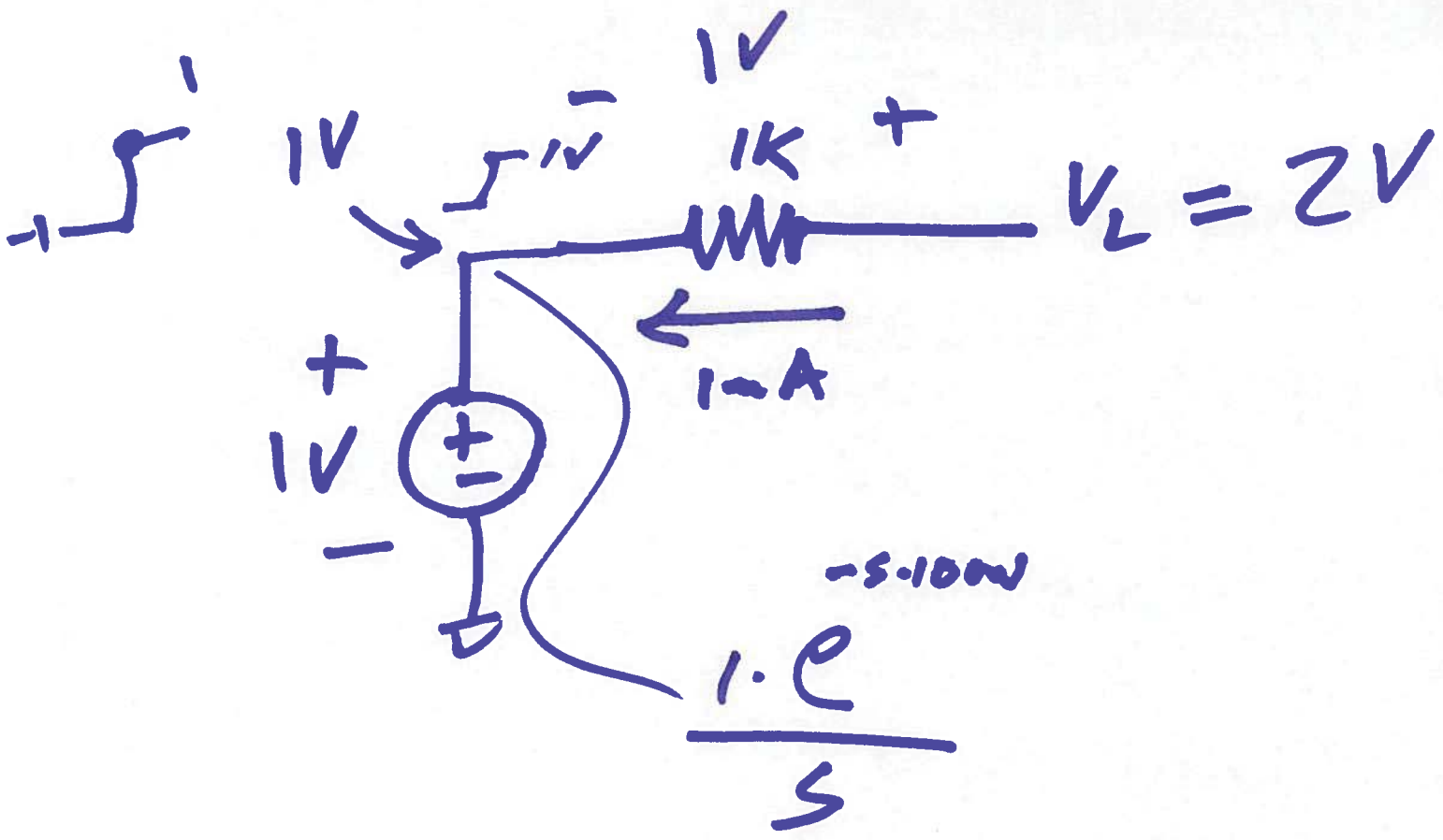
$$\frac{10^3}{10^{-4}} = \frac{1}{10^{-7}}$$

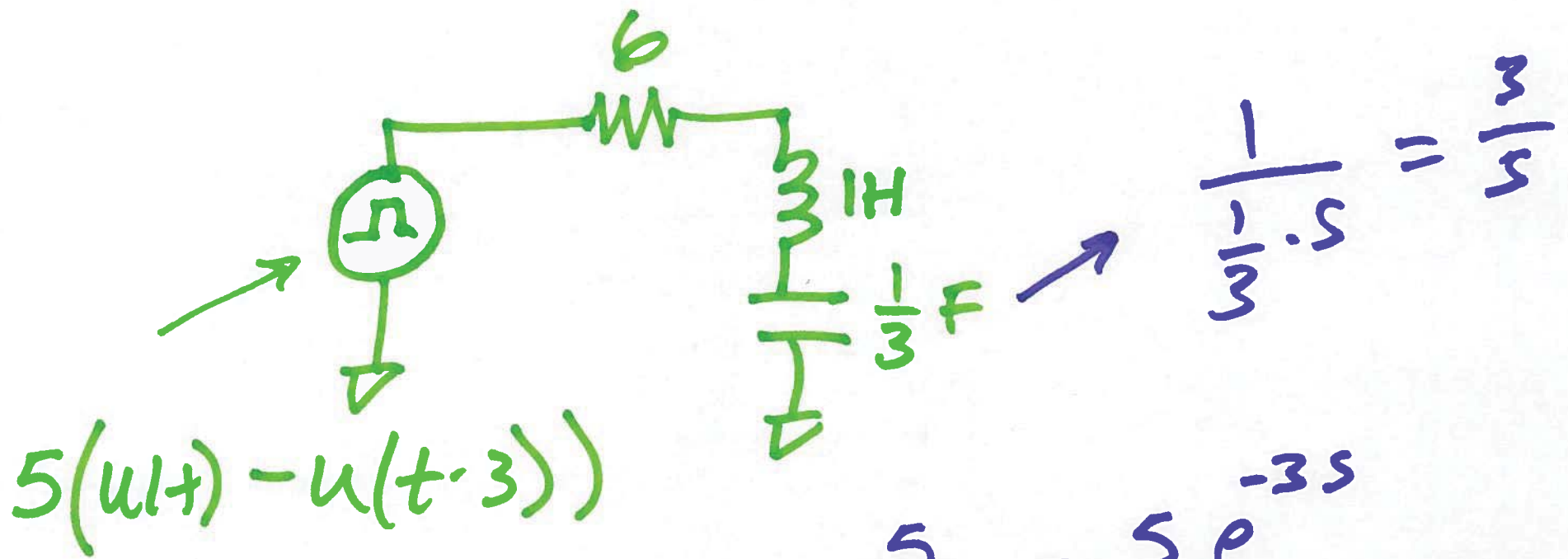
$$V_L(s) \cdot e^{1000 \cdot s} = \frac{3}{s + \frac{1}{10^{-7}}}$$

$$V_L(s) = \frac{e^{-1000 \cdot s} \cdot 3}{s + \frac{1}{10^{-7}}}$$

$$v_L(t) = 3 e^{-\frac{(t-1000)}{10^{-7}}} u(t-1000)$$

4)





$$I_2(s) = \frac{\frac{5}{s} - \frac{5}{s}e^{-3s}}{6 + s + \frac{2}{3}}$$

$$I_2|_1 = \frac{5}{3 + 6s + s^2}$$

4)

$$\frac{5}{s^2 + 6s + 3} = \frac{A}{(s - \quad)} + \frac{B}{(s - \quad)}$$

=

$$\sqrt{24} = \sqrt{4 \cdot 6} = 2\sqrt{6}$$

$$s = \frac{-6 \pm \sqrt{36 - 12}}{2} = -3 \pm \sqrt{6}$$

$$\frac{5}{(s + 3 + \sqrt{6})(s + 3 - \sqrt{6})}$$

7)

$$\frac{5}{(s+3+\sqrt{6})(s+3-\sqrt{6})} = \frac{A}{s+3+\sqrt{6}} + \frac{B}{s+3-\sqrt{6}}$$

$$A = \frac{5}{(-3-\sqrt{6}+3-\sqrt{6})} = \frac{-5}{2\sqrt{6}}$$

$$B = \frac{5}{(3-\sqrt{6}+3+\sqrt{6})} = \frac{5}{2\sqrt{6}}$$

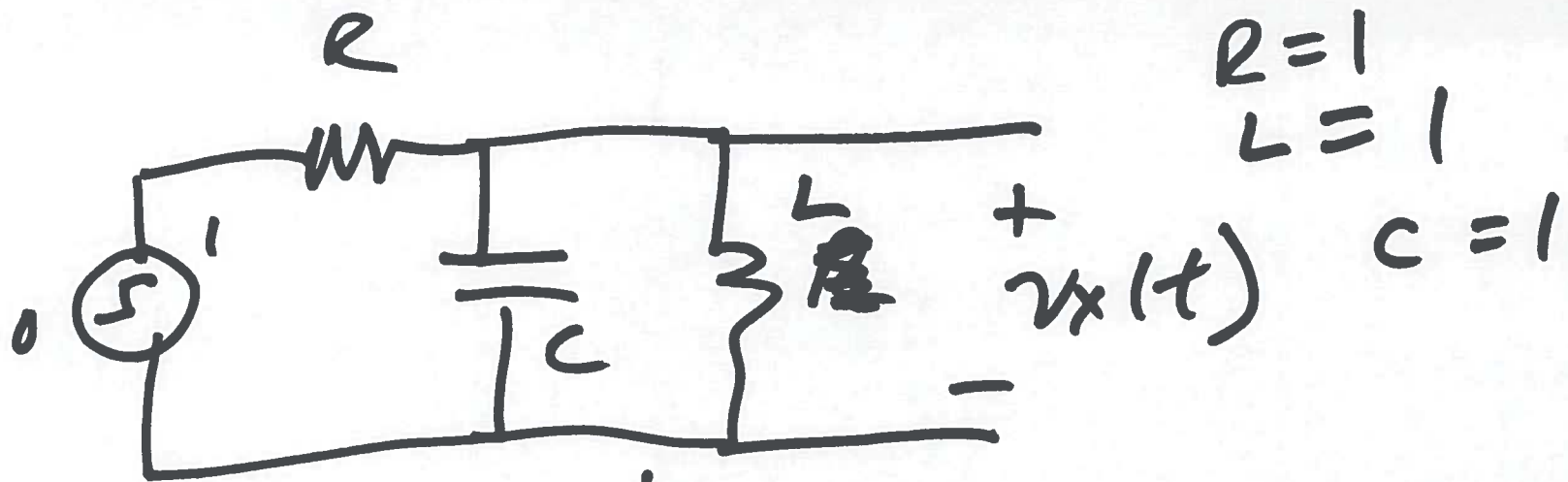
$$I_2(s) = \frac{-\frac{5}{2\sqrt{6}}}{s+3+\sqrt{6}} + \frac{\frac{5}{2\sqrt{6}}}{s+3-\sqrt{6}}$$

8)

$$i_1(t) = \left(-\frac{5}{2\sqrt{6}} e^{-(3+\sqrt{6})t} + \frac{5}{2\sqrt{6}} e^{-(3-\sqrt{6})t} \right)$$

$$\Rightarrow \Rightarrow - \left(-\frac{5}{2\sqrt{6}} e^{-(3+\sqrt{6})(t-3)} + \frac{5}{2\sqrt{6}} e^{-(3-\sqrt{6})(t-3)} \right) \cdot u(t-3)$$

a)



$$V_x(s) = \frac{\frac{1}{RC}}{(s-s_1)(s-s_2)}$$

$$s_1 = -\frac{1}{2RC} \pm \frac{1}{2} \sqrt{\left(\frac{1}{RC}\right)^2 - \frac{4}{LC}}$$

$$= -\frac{1}{2} \pm \frac{1}{2} \sqrt{1-4}$$

$$= -\frac{1}{2} \pm j \cdot \frac{\sqrt{3}}{2}$$

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10)

$$V_x(s) = \frac{1}{RC} \frac{1}{\left(s + \frac{1}{2} - j\frac{\sqrt{3}}{2}\right) \left(s + \frac{1}{2} + j\frac{\sqrt{3}}{2}\right)}$$

$$= \frac{A}{s + \frac{1}{2} - j\frac{\sqrt{3}}{2}} + \frac{B}{s + \frac{1}{2} + j\frac{\sqrt{3}}{2}}$$

$$A = \frac{\cancel{1}}{\cancel{RC}} \frac{1}{\left(-\frac{1}{2} + j\frac{\sqrt{3}}{2} + \frac{1}{2} + j\frac{\sqrt{3}}{2}\right)} = \frac{1}{j\sqrt{3}}$$

$$B = -\frac{1}{j\sqrt{3}}$$

11)

$$\left\{ \frac{1}{s+a} \right\} \Rightarrow e^{-at} u(t)$$

$$V_x(s) = \frac{\frac{1}{j\sqrt{3}}}{s + \frac{1}{2} - j\frac{\sqrt{3}}{2}} + \frac{-\frac{1}{j\sqrt{3}}}{s + \frac{1}{2} + j\frac{\sqrt{3}}{2}}$$

$$v_x(t) = \frac{1}{j\sqrt{3}} \left(e^{-t\left(\frac{1}{2} - j\frac{\sqrt{3}}{2}\right)} - e^{-t\left(\frac{1}{2} + j\frac{\sqrt{3}}{2}\right)} \right)$$

$$= \frac{e^{-t/2}}{\frac{\sqrt{3}}{2}} \left(\frac{e^{+j\left(t\frac{\sqrt{3}}{2}\right)} - e^{-j\left(t\frac{\sqrt{3}}{2}\right)}}{2j} \right)$$

$$v_x(t) = \frac{2}{\sqrt{3}} e^{-t/2} \sin\left(t\frac{\sqrt{3}}{2}\right)$$