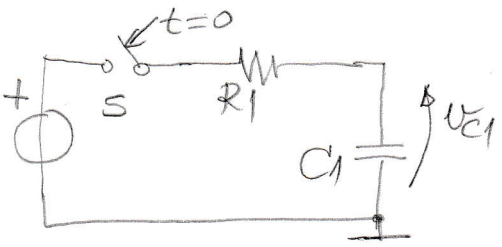
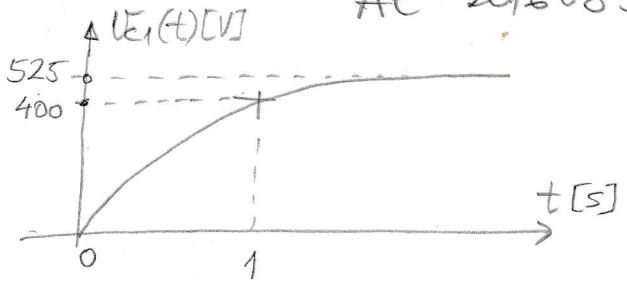
(1)





$$v_{C1}(t) = 525 \cdot (1 - e^{-\frac{t}{\tau}})$$

$$\tau = R1 \cdot C1$$

$$v_{C1}(1) = 400 = 525 \cdot (1 - e^{-\frac{1}{\tau}})$$

$$e^{-\frac{1}{\tau}} = 1 - \frac{400}{525} = 0{,}238 \; ; \; e^{\frac{1}{\tau}} = \frac{1}{0{,}238} = 4{,}2$$

$$\frac{1}{\tau} = \ln 4{,}2 \; ; \; \tau = \frac{1}{\ln 4{,}2} = 697\,ms.$$

$$R1 = \frac{\tau}{C1} = \frac{697 \cdot 10^{-3}}{10 \cdot 10^{-3}} = \underline{69{,}7\,\Omega}$$

$$W_C = \frac{1}{2} C1 \left(v_{C1}(1)\right)^2 = \frac{1}{2} \cdot 10 \cdot 10^{-3} \cdot 400^2 = \underline{800\,J = W_R}.$$

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(2)

$$I_D = \beta (V_{GS} - V_T)^2$$

$$V_{GS} - V_T = \sqrt{\frac{I_D}{\beta}}$$

$$V_T = V_{GS} - \sqrt{\frac{I_D}{\beta}} = 3{,}3 - \sqrt{\frac{2}{500 \cdot 10^{-3}}} = \underline{1{,}3\,V.}$$

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(3)

$$V_o = -V_g \frac{R_2}{R_1} \pm (V_{comp} \pm V_{io}) \frac{R_1 + R_2}{R_1}$$

$$V_{o1} = \pm V_{io} \frac{R_1 + R_2}{R_1} = \pm V_{io} \cdot \frac{10^4 + 10^6}{10^4}$$

$$V_{o1} = \pm 101\, V_{io}$$

$$V_{io} = \frac{V_{o1}}{101} = \frac{200}{101} = 1{,}98\,mV;$$

$$V_{comp} \pm V_{io} = 0$$

$$V_{comp} = \pm V_{io} = \underline{\pm 1{,}98\,mV}$$
