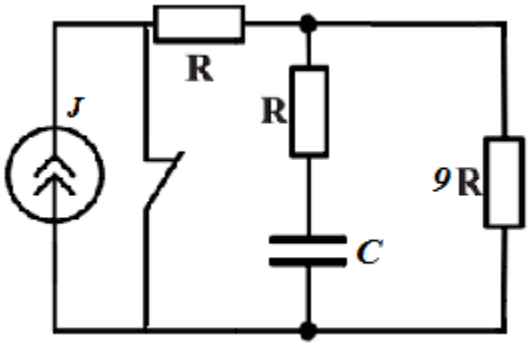
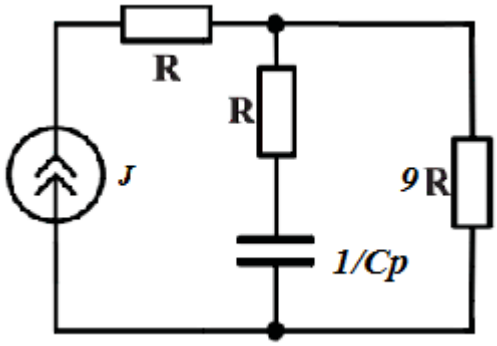
Задача 2





Найти напряжение на конденсаторе

$J = \delta(t)$ при импульном воздействии

$$U_b(p) := \frac{9\cdot R}{10\cdot R + \frac{1}{C\cdot p}}\cdot\frac{1}{C\cdot p}\ \text{simplify}\ \rightarrow \frac{9\cdot R}{10\cdot C\cdot R\cdot p + 1}$$

Находим переходную импульную функцию

$J(t) := 1$ $\quad R := 20$ $\quad C := 80\cdot 10^{-6}$

$$g(p) := \frac{9}{10\cdot R\cdot C}\cdot\left[\frac{R}{p + \frac{1}{(10\cdot R\cdot C)}}\right]$$

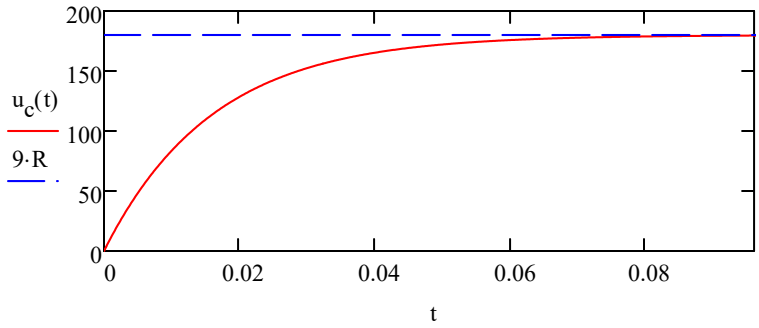
$$G(t) := \frac{9\cdot R}{10\cdot R\cdot C}\cdot e^{-\frac{t}{(10\cdot R\cdot C)}}$$

Оригинал переходной импульной функции

Находим свертку

$$u_c(t) := \int_0^t G(t-\tau)\cdot J(\tau)\,d\tau \qquad p := -\frac{1}{C\cdot R\cdot 10} = -62.5$$

$$\tau := \frac{1}{|p|} = 0.016 \qquad t := 0, 0.01\cdot\tau .. \tau\cdot 10$$

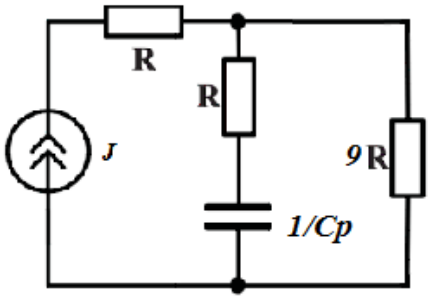


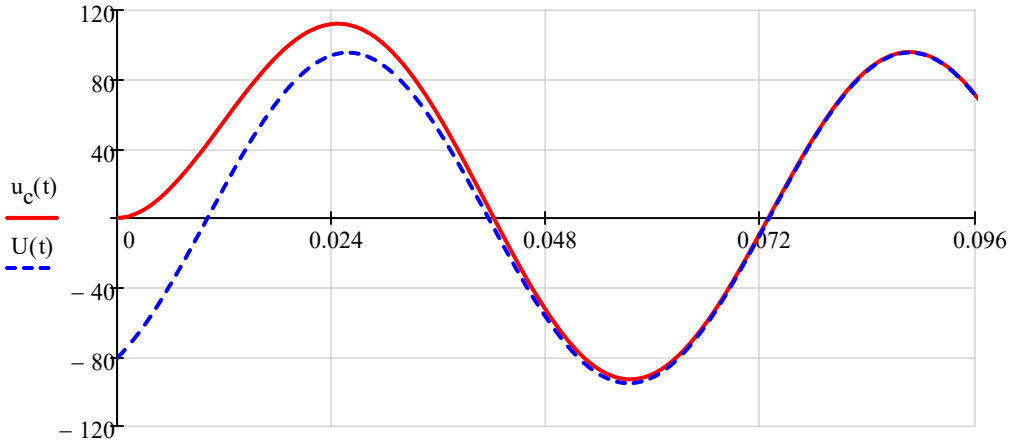
$\omega := 100$ $J(t) := 1 \cdot \sin(\omega \cdot t)$

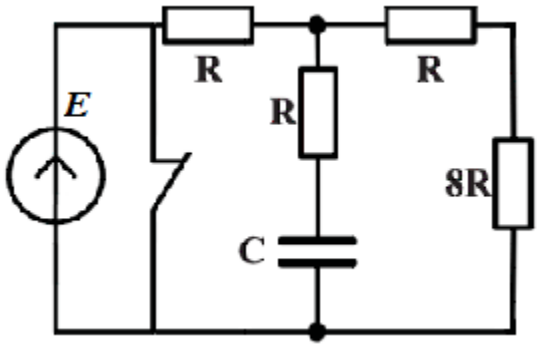
$$u_c(t) := \int_0^t G(t-\tau) \cdot J(\tau)\, d\tau$$

$$J1(\omega) := \frac{9 \cdot R}{10 \cdot R - \frac{j}{C \cdot \omega}} \cdot \left[\frac{-j}{(C \cdot \omega)}\right]$$

$T := \frac{2 \cdot \pi}{\omega} = 0.063$ $t := 0, 0.01 \cdot T .. 2 \cdot T$ $U(t) := |J1(\omega)| \cdot \sin(\omega \cdot t + \arg(J1(\omega)))$



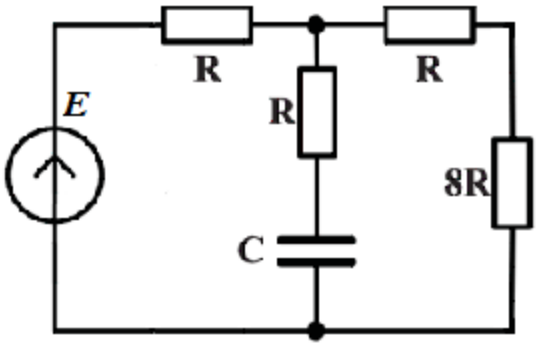




Задача 2

$E(t) := 1$ $R := 10$ $C := 100 \cdot 10^{-6}$

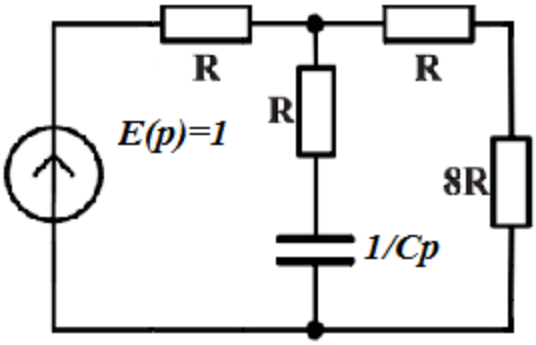
$$g(p) := \frac{9}{10 \cdot R \cdot C} \cdot \left[\frac{R}{p + \frac{1}{(10 \cdot R \cdot C)}}\right]$$



$E(t) = \delta(t)$ Импульное воздействие

Находим отклик ситемы при импульном воздействии

$$U_c(p) := \frac{9\cdot R}{10\cdot R}\cdot\frac{1}{R+\frac{1}{C\cdot p}}\cdot\frac{1}{C\cdot p}$$ передаточная функция



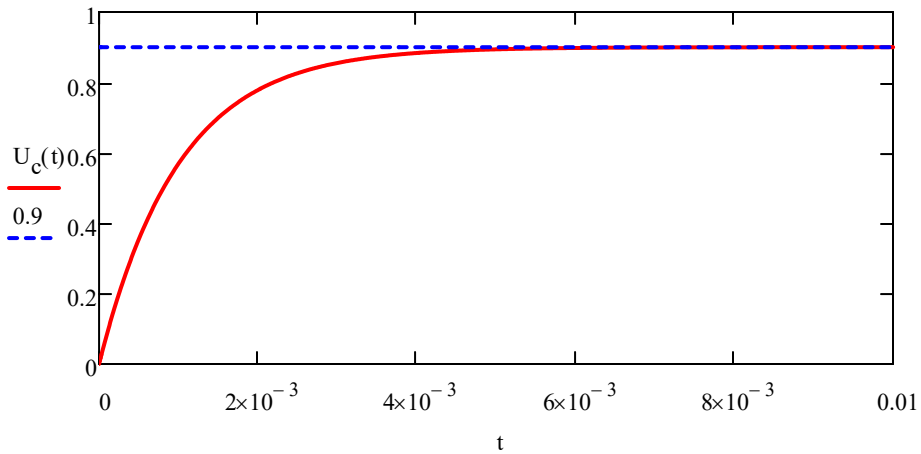
$$\frac{9}{10}\cdot\frac{1}{R+\frac{1}{C\cdot p}}\cdot\frac{1}{C\cdot p}\ \text{simplify}\ \rightarrow \frac{9}{10\cdot C\cdot R\cdot p+10}$$

$$w(p) := \frac{9}{10\cdot C\cdot R\cdot p+10}$$

$$w(p) := \frac{9}{10\cdot C\cdot R\cdot\left(p+\frac{10}{10\cdot C\cdot R}\right)}$$

$$w(t) := \frac{9}{10\cdot C\cdot R}\cdot e^{\frac{-t}{C\cdot R}} \qquad E(t) := 1 \qquad U_c(t) := \int_0^t w(t-\tau)\cdot E(\tau)\,d\tau \qquad p := -\frac{1}{C\cdot R} = -1\times 10^3$$

$$\tau := \frac{1}{|p|} = 1\times 10^{-3} \qquad t := 0, 0.01\cdot\tau .. \tau\cdot 10$$



$\omega := 100$

$E(t) := 1 \cdot \sin(\omega \cdot t)$

$$E\_ := \frac{0.9}{R - i \cdot \frac{1}{\omega \cdot C}} \cdot \left(\frac{-i}{\omega \cdot C} \right)$$

$E1(t) := |E\_| \cdot \sin(\omega \cdot t + \arg(E\_))$

$$w(t) := \frac{9}{10 \cdot C \cdot R} \cdot e^{\frac{-t}{C \cdot R}}$$

$$U_c(t) := \int_0^t w(t - \tau) \cdot E(\tau)\, d\tau$$

$$p := -\frac{1}{C \cdot R} = -1 \times 10^3$$

$$T := \frac{2 \cdot \pi}{\omega}$$

$$\tau := \frac{1}{|p|} = 1 \times 10^{-3}$$

$t := 0, 0.001 \cdot T .. 1 \cdot T$