

Entladen eines Kondensators - Theorie - Lösung

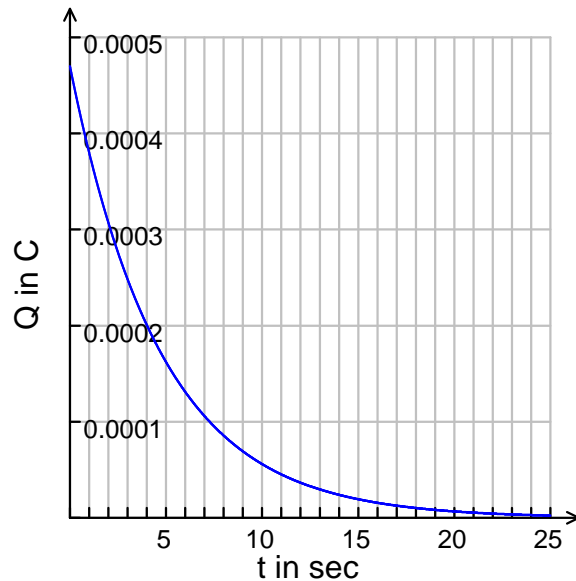
1.a)

$$Q(t) := Q_0 \cdot \exp\left(\frac{-1}{R \cdot C} t\right) \quad \text{"Done"} \quad Q_0 := -C \cdot U_0 \quad -c \cdot u_0$$

$$\frac{d}{dt}(Q(t)) + \frac{1}{R \cdot C} Q(t) = \frac{-U_0}{R} \quad 0 = \frac{-u_0}{r}$$

b)

$$R := 1E5 \quad 100000. \quad C := 4.7E-5 \quad .000047 \quad U_0 := -10 \quad -10$$



$$\text{delvar}(R) \quad \text{"Done"} \quad \text{delvar}(C) \quad \text{"Done"} \quad \text{delvar}(U_0) \quad \text{"Done"}$$

c)

$$Q(0) \quad -c \cdot u_0$$

d)

$$\lim_{t \rightarrow \infty} (Q(t)) = 0$$

e)

$$\text{round}\left(\frac{Q(R \cdot C)}{Q_0}, 2\right) \quad .37$$

f)

$$\text{solve}\left(Q(t) = \frac{1}{2} Q_0, t\right) \quad t = c \cdot \ln(2) \cdot r$$

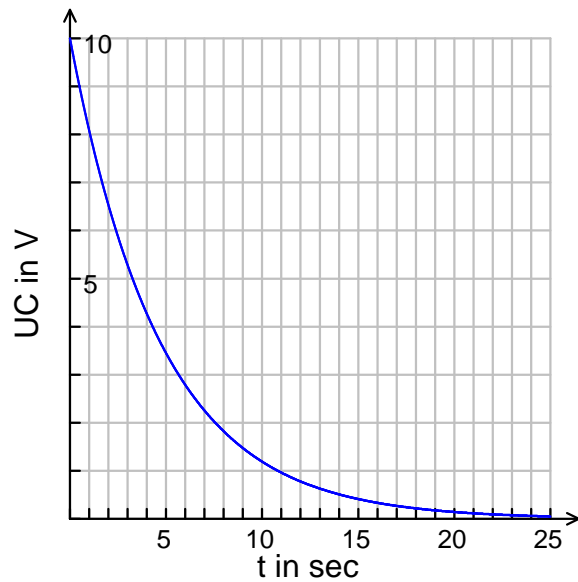
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2.a)

$$UC(t) := \frac{Q(t)}{C} \quad \text{"Done"} \quad UC(t) \quad -u0 \cdot e^{-t/(c \cdot r)}$$

b)

$$R := 1E5 \quad 100000. \quad C := 4.7E-5 \quad .000047 \quad U0 := -10 \quad -10$$



$$\text{delvar}(R) \quad \text{"Done"} \quad \text{delvar}(C) \quad \text{"Done"} \quad \text{delvar}(U0) \quad \text{"Done"}$$

c)

$$UC(0) \quad -u0$$

d)

$$\lim_{t \rightarrow \infty} (UC(t)) = 0$$

e)

$$\text{round}\left(\frac{UC(R \cdot C)}{-U0}, 2\right) \quad .37$$

f)

$$\text{solve}\left(UC(t) = \frac{1}{2} \cdot (-U0), t\right) \quad t = c \cdot \ln(2) \cdot r$$

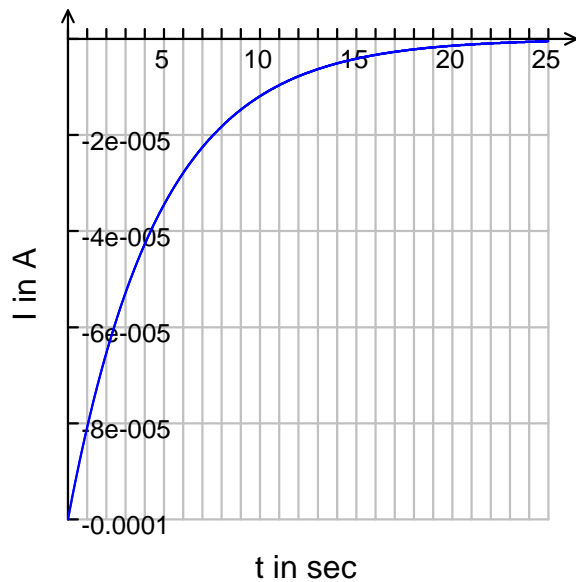
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3.a)

$$I(t) := \frac{d}{dt}(Q(t)) \quad \text{"Done"} \quad I(t) \quad \frac{u0 \cdot e^{-t/(c \cdot r)}}{r}$$

b)

$$R := 1E5 \quad 100000. \quad C := 4.7E-5 \quad .000047 \quad U0 := -10 \quad -10$$



$$\text{delvar}(R) \quad \text{"Done"} \quad \text{delvar}(C) \quad \text{"Done"} \quad \text{delvar}(U0) \quad \text{"Done"}$$

c)

$$I(0) \quad \frac{u0}{r}$$

d)

$$\lim_{t \rightarrow \infty} (I(t)) = 0$$

e)

$$\text{round}\left(\frac{I(RC)}{\frac{U0}{R}}, 2\right) \quad .37$$

f)

$$\text{solve}\left(I(t) = \frac{1}{2} \cdot \left(\frac{U0}{R}\right), t\right) \quad t = c \cdot \ln(2) \cdot r$$

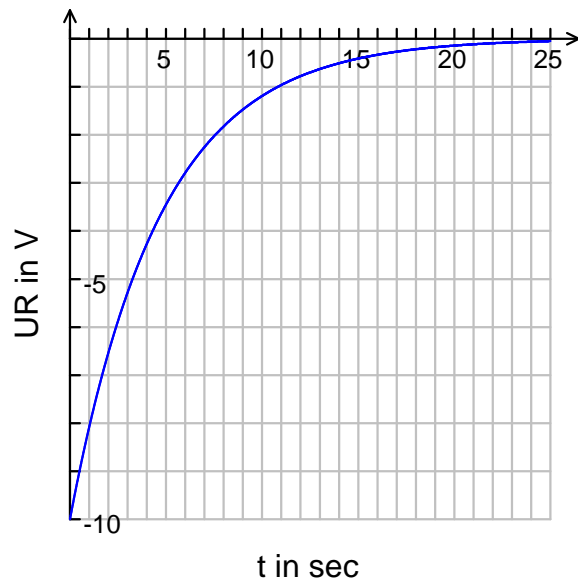
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4.a)

$$UR(t) := R \cdot I(t) \quad \text{"Done"} \quad UR(t) \quad u0 \cdot e^{-t/(c \cdot r)}$$

b)

$$R := 1E5 \quad 100000. \quad C := 4.7E-5 \quad .000047 \quad U0 := -10 \quad -10$$



$$\text{delvar}(R) \quad \text{"Done"} \quad \text{delvar}(C) \quad \text{"Done"} \quad \text{delvar}(U0) \quad \text{"Done"}$$

c)

$$UR(0) \quad u0$$

d)

$$\lim_{t \rightarrow \infty} (UR(t)) = 0$$

e)

$$\text{round}\left(\frac{UR(R \cdot C)}{U0}, 2\right) \quad .37$$

f)

$$\text{solve}\left(UR(t) = \frac{1}{2} \cdot (U0), t\right) \quad t = c \cdot \ln(2) \cdot r$$