

4.11

En kondensator, $C := 1000\mu\text{F}$, $U := 320\text{V}$ forsynes med en parallelkoblet aflademodstand, som skal sikre at kondensatorens spænding falder til $u_C := 50\text{V}$ indenfor $t := 60\text{sec}$ efter udkobling.

Beregn aflademodstandens størrelse.

$$\begin{aligned}u_C &= U \cdot e^{-\frac{t}{R \cdot C}} \\ \Downarrow \\ \frac{u_C}{U} &= e^{-\frac{t}{R \cdot C}} \\ \Downarrow \\ \ln\left(\frac{u_C}{U}\right) &= \ln\left(e^{-\frac{t}{R \cdot C}}\right) \\ \Downarrow \\ \ln\left(\frac{u_C}{U}\right) &= -\frac{t}{R \cdot C} \\ \Downarrow \\ R &= -\frac{t}{\ln\left(\frac{u_C}{U}\right) \cdot C}\end{aligned}$$

$$R := \frac{-t}{\ln\left(\frac{u_C}{U}\right) \cdot C} = \frac{-60 \cdot \text{sec}}{\ln\left(\frac{50 \cdot \text{V}}{320 \cdot \text{V}}\right) \cdot 1000 \cdot \mu\text{F}} = 32.322 \text{ k}\Omega$$