

Answer on question #59527, Math / Calculus

Question The Discharging characteristic for the capacitive circuit is given by the formula: $V = V_0 e^{-(t/T)}$, where $T=CR$ and is called the time constant $C = 100\text{nF}$ $R= 22\text{kOhms}$ and $V_0 = 5\text{V}$ Differentiate the charging equation and find the rate of change of voltage at $t=T$

Solution

$$\frac{dV}{dt} = -\frac{V_0}{T} e^{-(t/T)}$$

at $t=T$:

$$\frac{dV}{dt} = -\frac{V_0}{RC} e^{-1} = -\frac{5}{22 \cdot 10^3 \cdot 10^{-7}} \frac{1}{e} \approx -836\text{V/s}$$