

84. (Third problem of **Cluster**)

- (a) With the series pair C_2 and C_3 reduced to a single $C' = 10\ \mu\text{F}$ capacitor, this becomes very similar to problem 82. Noting for later use that $q' = q_2 = q_3$, and using notation similar to that used in the solution to problem 82, we have

$$Q = q_1 + q'$$

where $Q = C_1 V_{\text{bat}} = 400\ \mu\text{C}$. Also, after switch S is closed,

$$\begin{aligned} V_1 &= V' \\ \frac{q_1}{C_1} &= \frac{q'}{C'} \end{aligned}$$

which yields $\frac{1}{4}q_1 = q'$. Therefore,

$$Q = q_1 + \left(\frac{1}{4}q_1\right)$$

which gives the result $q_1 = 320\ \mu\text{C}$.

- (b) We use $q_2 = q_3 = \frac{1}{4}q_1$ to obtain the result $80\ \mu\text{C}$.
(c) See part (b).
(d) (e) and (f) Eq. 26-1 yields

$$V = \frac{q}{C} = \begin{cases} 8.0\ \text{V} & \text{for } C_1 \\ 5.3\ \text{V} & \text{for } C_2 \\ 2.7\ \text{V} & \text{for } C_3 \end{cases}$$