THIRD MIDTERM

In the circuit shown, initially $S_1$ is closed and $S_2$ is open. The capacitor values are given without the dielectric. Initially, a dielectric with $\varepsilon = 2.70$ is in $C_2$.

(a) Now $S_1$ is opened, and then $S_2$ is closed. Calculate the potential across $C_2$.

(b) With $S_1$ still open and $S_2$ still closed, the dielectric is moved from $C_2$ to $C_3$. Calculate the potential and charge on all capacitors.

\[ C = 175 \text{ V} \]
\[ C_1 = 100 \text{ pF} \]
\[ C_2 = 30 \text{ pF} \]
\[ C_3 = 150 \text{ pF} \]

\[ e = 8110 \text{ pF} \]

\[ Q = \frac{Q_2}{100} + \frac{1}{81} = \left( \frac{44.75 \text{ pF}}{100} \right) \]

\[ Q_2 = (44.75 \text{ pF}) \times 175 = 7.83 \times 10^{-9} \text{ C} \]

\[ Q_3 = \frac{Q_2}{150} = \frac{44.75 \text{ pF}}{150} = U_3 \]

\[ Q_0 = 7.83 \times 10^{-9} \]

\[ C = \frac{Q}{V} \]

\[ V_1 = \frac{Q_2}{C_1} \]

\[ V_2 = \frac{Q_3}{C_2} \]