HW #3

Chapter 31 #3

\[ C = 9.70 \, \text{pF} \]
\[ \Delta V = 18.6 \, \text{V} \]

a) What is area?\[ C = \varepsilon_0 \frac{A}{d} \]
\[ \varepsilon_0 \cdot A = \frac{C \cdot d}{\varepsilon_0} = 1.32 \, \text{m}^2 \]

b) \( d \) is now decreased to 0.1 mm.
\[ C_{\text{new}} = \varepsilon_0 \frac{A}{0.1} = 1.16 \, \text{pF} \]

c) \( Q \) was held constant. What is new \( AV \)?
\[ Q > CV \Rightarrow V = \frac{Q}{C} = \frac{C_{\text{old}} \Delta V \cdot d}{C_{\text{new}}} = 10.8 \, \text{V} \]
You might make a microphone by making one of the plates vibrate in sound waves. This will alter the capacitance.

\[ C \quad \text{just need Q and then you can watch} \]
\[ \Delta V \text{ change w/ sound waves.} \]

\[ C = 1.00 \mu F \quad \Delta V = 110 V \]

So to store 1.0 C, you want to dump 1.0 C on one side (not add them all up). So...

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

Now, to get the \# of capacitors \( \Rightarrow \) add them up. Since in parallel \( n \) adding:

\[ C_p = C_1 + C_2 + \cdots = nC \]

because \( C_1 = C_2 = C_3 \cdots \)
so \[ Q = \varepsilon_i V = n CV \]

\[ \Rightarrow n = \frac{Q}{CV} = 9090.9 \text{ of them} \]

(\text{I'd call that 9091}).