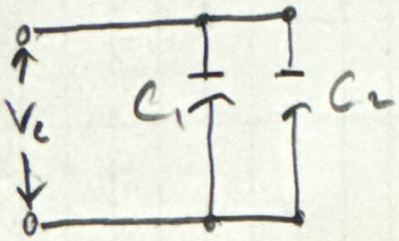
Luke Verlangieri | 320 HW 2 Q5

Parallel Case



$$Q_1 = C_1 V_c$$

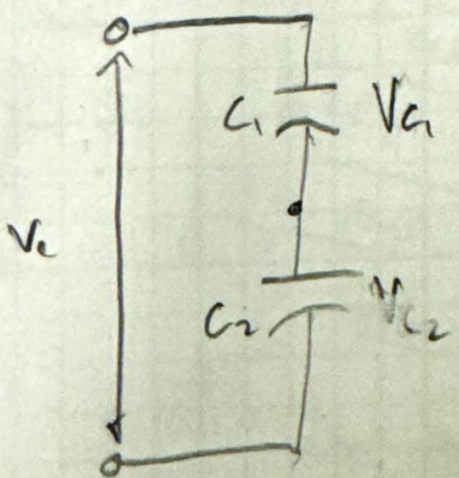
$$Q_2 = C_2 V_c$$

$$\boxed{Q = C_1 V_c + C_2 V_c}$$

$$Q = (C_1 + C_2) V_c$$

$$\boxed{C = C_1 + C_2}$$

Series Case



$$V_c = V_{C_1} + V_{C_2} \rightarrow Q = Q_1 = Q_2$$

$$\frac{Q}{V_C} = \frac{Q}{C_1} + \frac{Q}{C_2} = Q\left(\frac{1}{C_1} + \frac{1}{C_2}\right)$$

$$\boxed{\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}}$$

The charges of capacitors in series are the same because the same amount of current flows through each capacitor, therefore the amount they are charged is the same.