19. (a) After the switches are closed, the potential differences across the capacitors are the same and the two capacitors are in parallel. The potential difference from a to b is given by $V_{ab} = Q/C_{\rm eq}$, where Q is the net charge on the combination and $C_{\rm eq}$ is the equivalent capacitance. The equivalent capacitance is $C_{\rm eq} = C_1 + C_2 = 4.0 \times 10^{-6}\,\rm F$. The total charge on the combination is the net charge on either pair of connected plates. The charge on capacitor 1 is

$$q_1 = C_1 V = (1.0 \times 10^{-6}\,\mathrm{F})(100\,\mathrm{V}) = 1.0 \times 10^{-4}\,\mathrm{C}$$

and the charge on capacitor 2 is

$$q_2 = C_2 V = (3.0 \times 10^{-6}\,\mathrm{F})(100\,\mathrm{V}) = 3.0 \times 10^{-4}\,\mathrm{C}\ ,$$

so the net charge on the combination is $3.0 \times 10^{-4}\,\mathrm{C} - 1.0 \times 10^{-4}\,\mathrm{C} = 2.0 \times 10^{-4}\,\mathrm{C}$. The potential difference is

$$V_{ab} = \frac{2.0 \times 10^{-4}\,\mathrm{C}}{4.0 \times 10^{-6}\,\mathrm{F}} = 50\,\mathrm{V}\ .$$

(b) The charge on capacitor 1 is now $q_1 = C_1 V_{ab} = (1.0 \times 10^{-6}\,\mathrm{F})(50\,\mathrm{V}) = 5.0 \times 10^{-5}\,\mathrm{C}$.

(c) The charge on capacitor 2 is now $q_2 = C_2 V_{ab} = (3.0 \times 10^{-6}\,\mathrm{F})(50\,\mathrm{V}) = 1.5 \times 10^{-4}\,\mathrm{C}$.