8. The individual magnitudes $\left|\vec{E}_1\right|$ and $\left|\vec{E}_2\right|$ are figured from Eq. 23-3, where the absolute value signs for q are unnecessary since these charges are both positive. Whether we add the magnitudes or subtract them depends on if $\vec{E}_1$ is in the same, or opposite, direction as $\vec{E}_2$. At points to the left of q_1 (along the $-x$ axis) both fields point leftward, and at points right of q_2 (at $x > d$) both fields point rightward; in these regions the magnitude of the net field is the sum $\left|\vec{E}_1\right| + \left|\vec{E}_2\right|$. In the region between the charges $(0 < x < d)$ $\vec{E}_1$ points rightward and $\vec{E}_2$ points leftward, so the net field in this range is $\vec{E}_{\text{net}} = \left|\vec{E}_1\right| - \left|\vec{E}_2\right|$ in the $\hat{\text{i}}$ direction. Summarizing, we have

$$\vec{E}_{\text{net}} = \hat{\text{i}}\,\frac{1}{4\pi\varepsilon_0}\begin{cases} -\frac{q_1}{x^2} - \frac{q_2}{(d+|x|)^2} & \text{for } x < 0 \\ \frac{q_1}{x^2} - \frac{q_2}{(d-x)^2} & \text{for } 0 < x < d \\ \frac{q_1}{x^2} + \frac{q_2}{(x-d)^2} & \text{for } d < x \end{cases} .$$

We note that these can be written as a single expression applying to all three regions:

$$\vec{E}_{\text{net}} = \frac{1}{4\pi\varepsilon_0}\left(\frac{q_1 x}{|x|^3} + \frac{q_2(x-d)}{|x-d|^3}\right)\hat{\text{i}} .$$

For $-0.09 \le x \le 0.20$ m with $d = 0.10$ m and charge values as specified in the problem, we find