[lex39] Electrostatic field of two point charges

Consider two point charges $q_1 = 5\text{nC}$ and $q_2 = 7\text{nC}$ positioned at $\mathbf{x}_1 = (2\,\hat{\mathbf{i}} - 3\,\hat{\mathbf{j}} + 4\,\hat{\mathbf{k}})\text{cm}$ and $\mathbf{x}_2 = (6\,\hat{\mathbf{i}} + 8\,\hat{\mathbf{j}} - 2\,\hat{\mathbf{k}})\text{cm}$, respectively.
(a) Find the electric field at position $\mathbf{x} = (-5\,\hat{\mathbf{i}} + 2\,\hat{\mathbf{j}} + 9\,\hat{\mathbf{k}})\text{cm}$ and express it in the form $\mathbf{E} = (E_x\,\hat{\mathbf{i}} + E_y\,\hat{\mathbf{j}} + E_z\,\hat{\mathbf{k}})\text{N/C}$ with explicit numerical values of the three components.
(b) Find two positions $\mathbf{x}'$ at which the electrostatic field generated by the two charges is $\mathbf{E}' = (-5000\,\hat{\mathbf{i}} + 3000\,\hat{\mathbf{j}} + 1000\,\hat{\mathbf{k}})\text{N/C}$

Solution: