NAME & ID

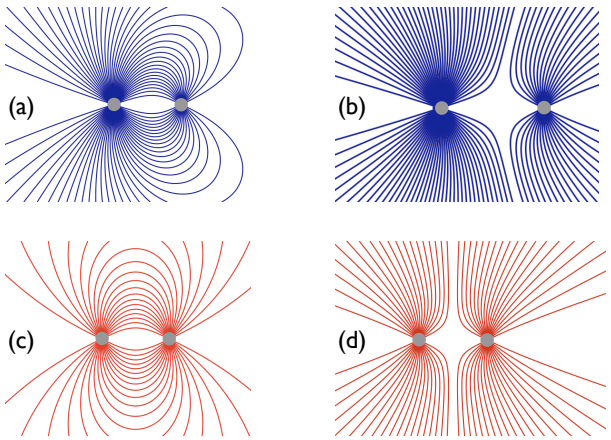
PH 102 / LeClair Summer II 2009

Quiz 2: Electrostatics

$\vec{\mathbf{F}}_{12} = k_e \frac{q_1 q_2}{r_{12}^2} \hat{\mathbf{r}}_{12}$ $k_e \approx 9\times10^9 \left[\frac{\mathrm{N}\cdot\mathrm{m}^2}{\mathrm{C}^2}\right]$ $e = 1.6\times10^{-19}$ [C] $m_e = 9.11\times10^{-31}$ [kg] $m_p = 1.67\times10^{-27}$ [kg]

1. An electron (of charge $-e$ and mass m_e) enters a region of uniform electric field $\vec{\mathbf{E}} = 200\,\hat{\mathbf{x}}$ [N/C] with velocity $\vec{\mathbf{v}}_i = 3.0\times10^6\,\hat{\mathbf{x}}$ [m/s]. What is magnitude the acceleration $|\vec{\mathbf{a}}|$ of the electron due to the electric field? Recall $\vec{\mathbf{F}} = m\vec{\mathbf{a}}$.

2. Which set of electric field lines below could represent the electric field near two charges of the *same sign*, but *different magnitudes*?



3. A "free" electron and a "free" proton are placed in an identical electric field. Which of the following statements are true? *Check all that apply.* Note the electron mass and proton mass above.

- ☐ Each particle is acted on by the same electric force and has the same acceleration.
- ☐ The electric force on the proton is greater in magnitude than the force on the electron, but in the opposite direction.
- ☐ The electric force on the proton is equal in magnitude to the force on the electron, but in the opposite direction.
- ☐ The magnitude of the acceleration of the electron is greater than that of the proton.
- ☐ Both particles have the same acceleration.