Assume that in the interstellar space the distance between two electrons is 0.82 cm. The electric force between these two electrons is: a) repulsive; b) attractive.

Solution: It is known, that charges of the same sign repel each other. Every electron has a negative charge; we can make a conclusion that they are repelled from each other. The repulsive force F can be calculated from the Coulomb's law equation: $F = k_e \cdot \dfrac{q_1 \cdot q_2}{r^2} = k_e \cdot \dfrac{e \cdot e}{r^2} = k_e \dfrac{e^2}{r^2}$, where k_e = 9·10⁹ N·m²·C⁻²;

e = 1.6·10⁻¹⁹ C (electric charge of the electron); r is the distance between charges, m.

Then, $F = 9 \cdot 10^9 \cdot \dfrac{(1.6 \cdot 10^{-19})^2}{(8.2 \cdot 10^{-3})^2} = 3.43 \cdot 10^{-24}$ N.

Answer: a) Between these two electrons is a repulsive force of 3.43·10⁻²⁴ N.