$F_p$ (a) Calculate the magnitude of the electric force between two electrons a distance $7.52 \times 10^{-11}$ m apart.

$$F = k \frac{e^2}{r^2} = 4.07 \times 10^{-8} (N)$$

$F_p$ (b) A conducting sphere of radius 0.175 m is charged with a negative charge of $6.73 \times 10^4$ C. Calculate the potential at its surface.

$$V = k \frac{Q}{R} = -3.46 \times 10^5 (V)$$

$F_p$ (c) For the arrangement shown, what is the potential difference $V(B) - V(A)$?

$$V(B) - V(A) = \frac{kQ}{2\Delta} (V) = \frac{kQ}{\Delta} + \frac{2kQ}{\Delta}$$

$F_p$ (d) A very long, thin wire has a total charge of $Q = +1.57 \times 10^4$ C uniformly distributed on its total length of 47.2 m. Calculate the magnitude of the electric field a distance 1.75 mm away from the center of the wire at a point nowhere near its ends. The wire has a radius of 1.00 mm.

$$E = \frac{\lambda}{2\pi\epsilon_0 r} = 3.42 \times 10^5 (N/C), \quad \lambda = \frac{Q}{L}$$

$F_p$ (e) Calculate the coefficient involving the $x^3$ term using the binomial expansion for

$$2.19 = \frac{3}{16} = \frac{1}{6} \left[(\frac{3}{2})(-\frac{3}{2})(-\frac{3}{2})\left(1-x^4\right)^2\right](-1)$$