

1 Electric Field of a Point Charge from the Potential

The electrostatic potential due to a point charge at the origin is given by:

$$V = \frac{1}{4\pi\epsilon_0} \frac{q}{r}$$

- (a) Find the electric field due to a point charge at the origin as a gradient in rectangular coordinates.
- (b) Find the electric field due to a point charge at the origin as a gradient in spherical coordinates.
- (c) Find the electric field due to a point charge at the origin as a gradient in cylindrical coordinates.