

## Exercise 23.44 - Copy

The potential due to a point charge  $Q$  at the origin may be written as  $V = \frac{Q}{4\pi\epsilon_0 r} = \frac{Q}{4\pi\epsilon_0 \sqrt{x^2 + y^2 + z^2}}$

### Part A

Calculate  $E_x$  using equation  $E_x = -\frac{\partial V}{\partial x}$ .

Express your answer in terms of the given quantities and appropriate constants.

ANSWER:

$$E_x = \frac{Qkx}{(x^2 + y^2 + z^2)^{\frac{3}{2}}}$$

Correct

### Part B

Calculate  $E_y$  using equation  $E_y = -\frac{\partial V}{\partial y}$ .

Express your answer in terms of the given quantities and appropriate constants.

ANSWER:

$$E_y = Qky(x^2 + y^2 + z^2)^{-\frac{3}{2}}$$

Correct

### Part C

Calculate  $E_z$  using equation  $E_z = -\frac{\partial V}{\partial z}$ .

Express your answer in terms of the given quantities and appropriate constants.

ANSWER:

$$E_z = Qkz(x^2 + y^2 + z^2)^{-\frac{3}{2}}$$

**Correct**