

Electric Field from Electric Potential in Two Dimensions



- Given is the electric potential: $V(x, y) = ax^2 + bxy^3$ with $a = 1\text{V/m}^2$, $b = 1\text{V/m}^4$.
- Find the electric field: $\vec{E}(x, y) = E_x(x, y)\hat{i} + E_y(x, y)\hat{j}$ via partial derivatives.

$$E_x = -\frac{\partial V}{\partial x} = -2ax - by^3, \quad E_y = -\frac{\partial V}{\partial y} = -3bxy^2$$

