

Homework 1

Due date: 16/08/2022

1. Consider an electric field given by $\vec{E} = y\vec{j}$. ie. It is a linearly varying electric field along the y-axis.
 - a. If a charge is a point A (0,0,0). What is the work done in moving a unit positive charge from A to B(1,1,0) along (i) shortest distance and (ii) parabolic path described by $y = x^2$.
 - b. What happens if move the charge along a closed path along the square say (0,0), (0,1),(1,1),(1,0)
 - c. Now move the charge along the same closed path, square as described, in an electric field given by $E = x\vec{j}$.

The first electric field is called as a conservative field and the second field is non conservative.

2. Read about the consequence of Maxwell's addition to Ampere laws. How come it described light ?
3. What is the role of permittivity (of free space and a material) and magnetic permeability. Give a short paragraph on both.
4. Derive the expression for capacitance of a parallel plate from the definition of capacitance $V = C \frac{\rho d}{\epsilon}$