Question 1:

A constant electric field \( \mathbf{E} = 100 \frac{N}{C} \mathbf{i} \) is present throughout a region of space that includes the plane bounded by the \( x \) and \( y \) axes and the lines \( x = 30\text{cm} \) and \( y = 50\text{cm} \). The electric flux at the plane’s surface, in \( \text{N/C} \), is

A. 0
B. 0.25
C. 25
D. 50
E. 100
Application of Gauss’s Law

Infinite uniformly charged line

\( \lambda \ [\text{C/m}] \): Charge per unit area

\( r \)
Application of Gauss’s Law

Charge distribution has cylindrical symmetry

\[ \lambda \ [C/m]: \text{Charge per unit area} \]

\[ \vec{E} = |\vec{E}| \hat{r} \]
Step 1: Define surface such that

1) $\vec{E} \cdot \hat{n}$ is constant throughout the surface

Or

2) $\vec{E} \cdot \hat{n}$ is zero throughout the surface
Surfaces 1 and 3

Electric field is always parallel to the surface

Flux through these surfaces are zero