

Assignment 1 - Engineering Electromagnetics.

Deadline: 25.11.2011.

1. N. Ida: Problem 3.18.

Hint: You may need the integral $\int \frac{1}{(x^2 + 1)^{\frac{3}{2}}} dx = \frac{x}{\sqrt{x^2 + 1}} + C$.

2. N. Ida: Problem: 3.19.

3. During a thunderstorm the atmospheric electric field is found to be pointing vertically downwards. The value of the field is 200 Vm^{-1} at earth surface level and 25 Vm^{-1} at a height of 1000 m . What is the the *average* (volume) charge density in this height range ?

4. Two very long, hollow and conducting cylinders with a common axis have radii a and b , respectively ($a < b$). The cylinders are given constant surface charge densities ρ_a and ρ_b . Calculate the electric field as a function of the distance, r , from the axis.

5. N. Ida: Problem 4.49.

Hint: Use the following expression for the electrostatic energy, W , due to an electric field, \mathbf{E} :

$$W = \frac{1}{2} \int_V \epsilon_0 E^2 dV.$$