

FINAL. PHYS 208. SPRING 2009.

LAST NAME:

FIRST NAME:

1. Electric Field.

Two particles having charges $q_1 = 1 \text{ nC}$ and $q_2 = 3 \text{ nC}$ are separated by a distance of 1.20 m. At what point along the line connecting the two charges is the total electric field due to the two charges equal to zero?

2. Gauss Law

Positive electric charge Q is distributed uniformly throughout the volume of an insulating sphere with radius R . Derive an expression of the electric field as a function of the radial distance r for $r < R$ and $r > R$. Plot the results of $E(r)$ versus r .

3. DC circuits

Find the current in each branch of the circuit shown below.

4. Ampere law

A cylindrical conductor with radius R carries a current I . The current is uniformly distributed over the cross-section area of the conductor. Find the magnetic field as a function of the distance r from the conductor axis for points inside ($r < R$) and outside ($r > R$) the conductor. Sketch the solution of the magnetic field as a function of r .