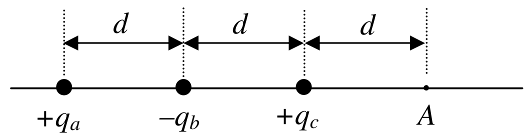
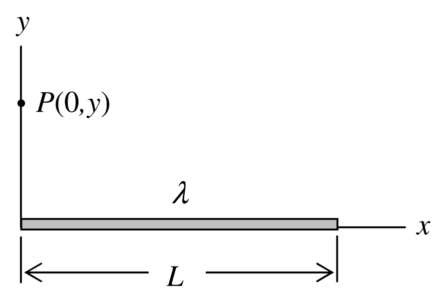
UNIVERSITY OF GAZIANTEP		14/07/2005
DEPARTMENT OF ENGINEERING PHYSICS		TIME 90 min.
EP 106 General Physics II		
First Midterm Exam Questions		SUMMER SCHOOL

[1]. Three point charges ($q_a = q_b = q_c = 1\text{x}10^{-6}$ C) are placed in the straight line at different points as shown in Figure. If $d = 5$ cm, determine



(a) the electric force acting on q_c
(b) the magnitude and direction of the electric field at point A due to these charges
(c) total electrostatic potential at point A due to these charges
(d) the electric potential energy required to remain the charges in the given configuration.

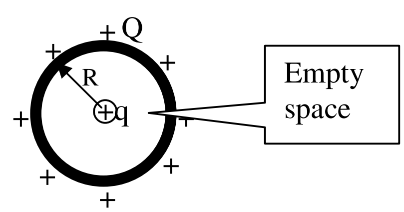
[2]. On a thin rod of length L lying along the x-axis with one end at the origin ($x = 0$), as in Figure, there is distributed a charge per unit length is given by $\lambda = Ax$, where A is a constant.



(a) If the total charge on the rod is Q, calculate the constant A in terms of Q and L.
(b) Find an expression for the electric potential at point $P(0,y)$.

Hint: $$\int \frac{x\,dx}{\sqrt{x^2 + a^2}} = \sqrt{x^2 + a^2} + c$$

[3]. Consider a spherical shell of radius 25 cm with a surface charge density of 60 μC/m^2. A point charge of 10 μC is located at the center of the spherical shell. Using the Gauss' law, determine the electric field at (a) $r = 40$ cm, (b) $r = 25$ cm and (c) $r = 15$ cm.



[4].

(a) When two capacitors are connected in parallel, the resulting combination has a total capacitance 9 μF. When the same two capacitors are connected in series, the resulting combination has a total capacitance 2 μF. What are the capacitances of the two capacitors?
(b) If these two capacitors are connected in parallel to a voltage source which has 12 Volts, what are the accumulated charges and voltage accross on each capacitor?
(c) Repeat part (b), if these two capacitors are connected in series.

Constants:
e=1.6x10^{-19} C, k= 9x10^9 N.m^2/C^2 , ε_o=8.85x10^{-12} C^2/N.m^2 , μ_o=4πx 10^{-7} T.m/A, 1μC = 10^{-6}C