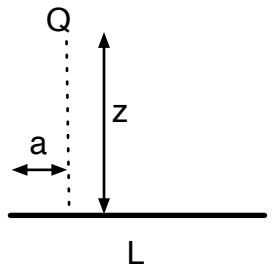
Homework #1; Phys 110A. Due in class on Thurs 9/1

1) A charge of 1 microCoulomb (μC) is located at the origin, a charge of -1 μC is located at (1,1,1), and a charge of 2 μC is located at (-1,2,0), and a 3μC particle is located at (-1,0,1). What is the net force (vector) on the 3μC particle? (All distance units in Meters). Note: no need to carry out exact calculations; use a calculator and round to 3 sig figs.

2) A straight line wire of length L carries a uniform charge per unit length of λ. Find the E-field at the point Q in the below diagram, located a distance z from the wire, as measured from a point on the wire a distance "a" from the end. (Use vector-component notation for your answer, defining the x-axis to be pointing to the right, and the z-axis pointing up.) See Example 2.2, but note that in that example the wire is 2L long. As always, please look up any integrals you need.



3) A charge Q is at the origin. Using the integral definition of Electric flux (Eqn 2.11), explicitly calculate the flux that passes through:

A) An infinite plane located at z=1meter.

B) An infinite plane located at z=2meters.

C) A hemisphere of radius 3 meters, on the z>0 side of the charge.

D) Discuss the connection between the above three answers, from a geometrical perspective.