

Self-Directed Project 1 – Computer Field Mapping

Due September 8, 2009, 5 pm

Worth: 5 pts toward final grade

1 Vector Fields

Write a program to draw the a vector field graph of the electric field for the following charge configurations: two equal positive charges, a $+1$ and -2 charge, and three equal negative charges arranged as an equilateral triangle. Feel free to use built-in routines. Matlab has routines that will do this fairly straightforwardly. Describe what you expect to see before you graph it, and verify that your expectations were correct. If not, explain what you had misunderstood.

2 Field Lines

Write and debug a program which plots the electric field lines for the three charge distributions given above. You may use any language you like but you may not use predefined routines to plot the field. This is a little trickier.

3 Generalize it (optional)

If you *really* want to do this right, write a program that will take a list of position vectors and the charges that should go at those positions, and then your program can do this for *any* configuration of charge. You will probably need to play around with how many field lines to draw per unit charge, though. You should make that ratio part of your input, at least until you figure out how the scaling works, and then you can set it based on the charges used. If you do this part first, the first two parts will be trivial, but I caution you that making your program perfectly general is probably not very easy.