Lab 1: Preparation Sheet

Name: Date:

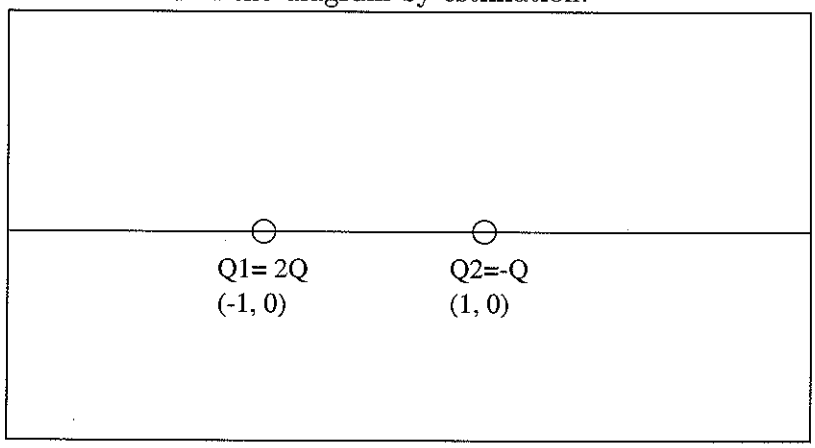
1 Conversion of a Vector from Cartesian Coordinates to Spherical Coordinates

A vector specified in Cartesian coordinates will in general result in all three components in spherical coordinates. However, there are several special cases in which the vector has only one component in spherical coordinates. Convert the following vectors to spherical coordinates. Write down their directions ($\vec{a_r}$, $\vec{a_\theta}$, $\vec{a_\phi}$).

No.	Cartesian coordinates		Direction of vectors in spherical coordinates
	Points	Vector	
1	(0, 0, 1)	(0, 0, 1)	
2	(0, 0, 1)	(1, 0, 0)	$\vec{a_\theta}$
3	(0, 0, 1)	(0, 1, 0)	
4	(0, 0, 1)	(0.6, 0.8, 0)	
5	(1, 0, 0)	(1, 0, 0)	
6	(1, 0, 0)	(0, 1, 0)	
7	(1, 0, 0)	(0, 0, 1)	
8	$(\frac{1}{3}, \frac{2}{3}, \frac{2}{3})$	$(\frac{1}{3}, \frac{2}{3}, \frac{2}{3})$	
9	$(\frac{1}{3}, \frac{2}{3}, \frac{2}{3})$	$(\frac{2}{3}, \frac{4}{3}, \frac{4}{3})$	

2 Direction Lines of Electric Field Due to Point Charges

Plot the lines of electric field in the diagram by estimation.



3 Equipotential Lines Due to Point Charges

For the point charges shown above, discuss the changes in potential starting from minus infinity to positive infinity along the x-axis.