

Magnets have a north and a south pole. If you make this magnet small enough so that it looks like a point, all you will see are the looping lines of force mapped out by iron filings or by using a compass.

**Problem 1** - Plot the following points in the order given and connect them with a smooth curve. You have just drawn a mathematical model of a portion of a magnetic line of force in the First Quadrant.

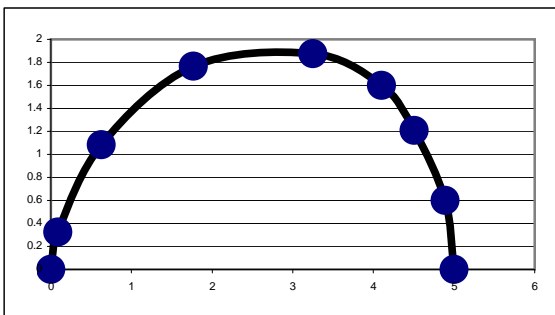
X	Y
+0.0	+0.0
+0.1	+0.3
+0.6	+1.1
+1.8	+1.8
+3.2	+1.9
+4.1	+1.6
+4.5	+1.2
+4.9	+0.6
+5.0	+0.0

**Problem 2** - From the x and y coordinates given, find the coordinates of the 8 midpoints between each of the segments you plotted in Problem 1 by finding the average coordinate of each pair of points.

**Problem 3** - At each of the midpoints to the segments, draw a line that represents the tangent of the curve at the midpoint. Place an arrow head mark so that the tangent 'arrows' are pointed in a counter-clockwise direction.

**Problem 4** - Reflect your diagram in the First Quadrant into quadrants 2, 3 and 4 to complete the magnetic field line drawing!

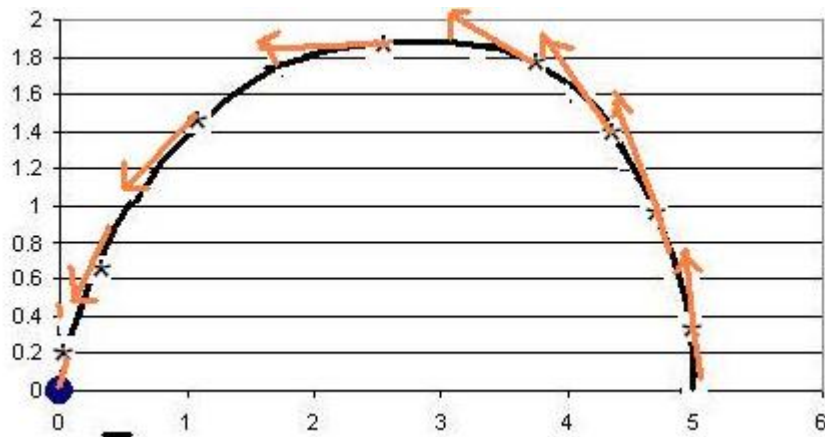
**Problem 1** - Plot the following points in the order given and connect them with a smooth curve. You have just drawn a mathematical model of a portion of a magnetic line of force in the First Quadrant.



**Problem 2** - From the x and y coordinates given, find the coordinates of the 8 midpoints between each of the segments you plotted in Problem 1 by finding the average coordinate of each pair of points.

Answer: Example:  $x_1 = (+0.1 + 0.0)/2 = +0.05$ ,  $y_1 = (+0.3 + 0.0)/2 = +0.15$  so  $(+0.05, +0.15)$  is the first midpoint.

**Problem 3** - At each of the midpoints to the segments, draw a line that represents the tangent of the curve at the midpoint. Place an arrow head mark so that the tangent 'arrows' are pointed in a counter-clockwise direction. Answer: See below.



**Problem 4** - Reflect your diagram in the First Quadrant into quadrants 2, 3 and 4 to complete the magnetic field line drawing!

Answer: Compare with the drawing in the Introduction to this problem set.