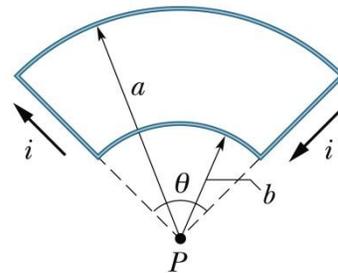


## Interactive Problem Set 23, SP212 Spring 2013

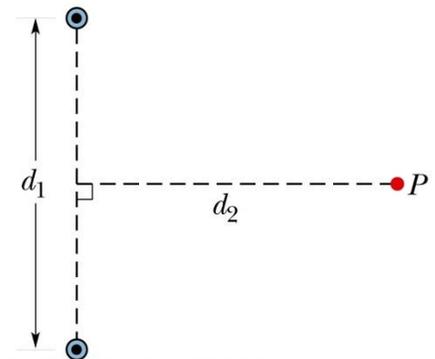
**Topic:** Calculating the Magnetic Field Using the Biot-Savart Law

### 1. The magnetic field due to straight wires and circular arc

- i. In the figure, two circular arcs have radii  $a = 13.5$  cm and  $b = 10.7$  cm, subtend angle  $\theta = 74.0^\circ$ , carry current  $i = 0.411$  A, and share the same center of curvature  $P$ . What are the **(a)** magnitude and **(b)** direction (into or out of the page) of the net magnetic field at  $P$ ?



- ii. The figure shows two very long straight wires (in cross section) that each carry a current of 4.00 A directly out of the page. Distance  $d_1 = 6.00$  m and distance  $d_2 = 4.00$  m. What is the magnitude of the net magnetic field at point  $P$ , which lies on a perpendicular bisector to the wires?



2. In the figure below, five long parallel wires in an  $xy$  plane are separated by distance  $d = 8.00$  cm, have lengths of 10.0 m, and carry identical currents of 3.00 A out of the page. Each wire experiences a magnetic force due to the other wires. In unit-vector notation, what is the net magnetic force on **(a)** wire 1, **(b)** wire 2, **(c)** wire 3, **(d)** wire 4, and **(e)** wire 5?

