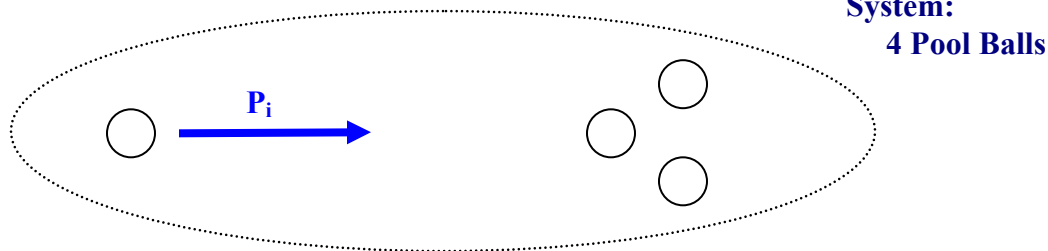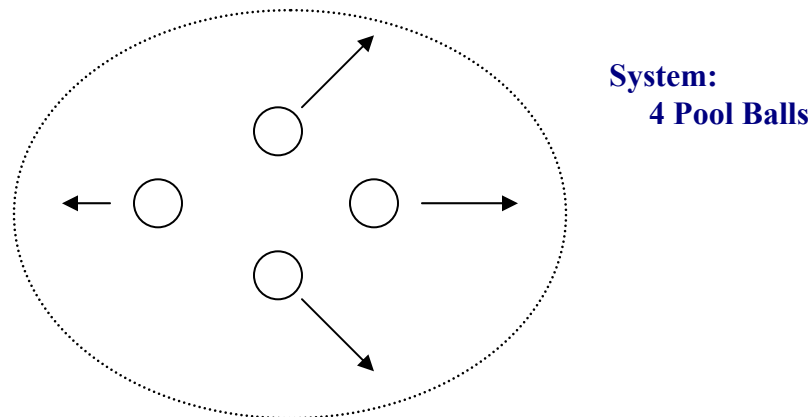# Conservation of Linear Momentum

Suppose you are at a pool table and strike a cue ball toward a rack of 3 balls. What do the initial and final momentum vectors look like?

Initially

System:
4 Pool Balls

P_i

Afterward

System:
4 Pool Balls

Using the <u>Tail-to-Tip method</u> for vector addition, the final momentum vector is:

P_f

➔

$P_i = P_f$

Since both vectors have the same size and direction, $P_i = P_f$, which means linear momentum is conserved during the process.

NOTE: Afterward, each individual ball had its own non-zero momentum, which means it is moving. But, because linear momentum was conserved, the total momentum of the system (*the sum of all the individual momentum vectors*) remained the same at all times.