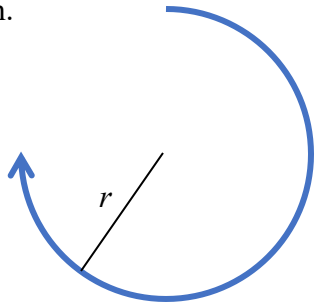
PHYS 1110 Group Work Sheet 5
Motion with vectors

With your group, discuss how to answer these questions and write your group answer in the space provided.

1. A pony on a lead of length r = 5.0 meters trots ¾ of the way around a complete circle.
   a. What distance did the pony travel? This is its path length.



   b. How far is the pony from where it started?

   c. We can define coordinates as we find useful. Let's place the origin (0, 0) at the center of the circle containing the pony's path, set the +x direction as →, and the +y direction as ↑.
      i. What are the coordinates of the start of the pony's path?

      ii. What are the coordinates of the end of the pony's path?

      iii. What is the pony's displacement vector?

2. From the illustrated initial and final velocity vectors $\vec{v}_0$ and $\vec{v}$, specify the vector of the change in velocity $\Delta\vec{v}$ (sketch and components).

   a. $\vec{v}_0 = (4, 0)\text{m/s}$ $\vec{v} = (3, 0)\text{m/s}$

   b. $\vec{v}_0 = (4, 0)\text{m/s}$ $\vec{v} = (4, -2)\text{m/s}$

c. $\vec{v}_0 = (4, 0)\text{m/s}$ $\vec{v} = (5, 0)\text{m/s}$

d. $\vec{v}_0 = (4, 0)\text{m/s}$ $\vec{v} = (0, 4)\text{m/s}$

3. A ball is thrown straight upward and allowed to fall back down.
   a. Draw a graph of the ball's height vs. time.

   b. Draw a graph of the ball's speed vs. time.

4. A ball is thrown upwards at an angle of 45° and allowed to fall to the ground.
   a. Draw a graph of the ball's height vs. time.

   b. Draw a graph of the ball's speed vs. time.