The picture to the left above shows a cart whose position is being measured by a sonic ranger at the top of a tilted air track. The graph of velocity vs. time, as determined by the ranger, is shown in the plot at the right of the picture. From the plot, do the following:

(a) Describe, in words, the motion of the car from \( t = 0 \) to \( t = 6 \) seconds. Be sure to include direction (up the track or down the track) and magnitude in your answer and indicate on the graph any times where the cart hits the bumper.

The cart's initial velocity is positive with respect to the air track. Between 0-1.5 sec, the cart is moving at a constant velocity (no acceleration). At 1.5 sec, it has moved uphill in front of the ranger. Between 1.5-3.0 sec, the cart is moving at a positive velocity (slope 2 m/s) away from the ranger. At 3.00 sec, hits the bumper and changes direction, velocity changes to negative direction. Moving toward the ranger until 4.5 sec when it reaches high, the direction of velocity change positive toward the bumper between 4.5 and 6 sec.

(b) If the bumper is at a position 2.0 meters in front of the ranger, find the position of