

## Integrals and Physics

1. The acceleration of a particle moving along the  $x$ -axis at time  $t$  is modeled by  $a(t) = 5t + 3$ . The velocity is 16 when  $t = 4$  and the position is 9 when  $t = 2$ . Write the position function,  $x$ , as a function of  $t$ .
  
2. A particle moves along the  $x$ -axis so that its velocity at any time  $t \geq 0$  is given by  $v(t) = 6t^2 - 6t + 4$ . The position  $x(t)$  is 13 when  $t = 1$ .
  - a. Write the position function,  $x(t)$  at any time  $t$ .
  
  
  
  
  
  
  
  
  
  
  - b. For what values of  $t$ ,  $0 \leq t \leq 2$ , is the particle's instantaneous velocity the same as the average velocity on the closed interval  $[0, 2]$ ?
  
  
  
  
  
  
  
  
  
  
  - c. Find the total distance traveled by the particle from time  $t = 0$  to  $t = 2$ .