

AP Calculus BC - Particle Motion Problems for Practice.

- [1980 BC #1] The acceleration of a particle moving along a straight line is given by $a(t) = 10e^{2t}$.
 - Write an expression for the velocity $v(t)$, in terms of t , if $v(0) = 5$.
 - During the time that the velocity increases from 5 to 13, how far does the particle travel?
 - Write an expression for the position $x(t)$, in terms of t of the particle, if $x(0) = 0$.
- [1986 BC #1] A particle moves along the x -axis so that at any time, its acceleration is given by $a(t) = \frac{1}{t}$. At time $t = 1$, the velocity of the particle $v(1) = -2$ and its position $x(1) = 4$.
 - Find the velocity $v(t)$ for $t \geq 1$.
 - Find the position $x(t)$ for $t \geq 1$.
 - What is the position of the particle when it is farthest to the left? Justify your answer.
- [1990 BC #1] A particle starts at time $t = 0$ and moves along the x -axis so that its position at any time $t \geq 0$ is given by $x(t) = (t-1)^3(2t-3)$.
 - Find the velocity of the particle at any time $t \geq 0$.
 - For what values of t is the velocity of the particle less than zero?
 - Find the value of t when the particle is moving to the left and the acceleration is zero.
- [1991 BC#1] A particle moves on the x -axis so that its velocity at any time $t \geq 0$ is given by $v(t) = 12t^2 - 36t + 15$. At $t = 1$, the particle is at the origin.
 - Find the position $x(t)$ of the particle for any time $t \geq 0$.
 - Find all values of t for which the particle is at rest.
 - Find the maximum velocity of the particle on $0 \leq t \leq 2$.
 - Find the total distance traveled by the particle from $t = 0$ to $t = 2$.