AP Calculus
Worksheet: Rectilinear Motion

1. A particle moves along the x-axis so that at any time t its position is given by x(t) = $t^3 - 6t^2 + 9t + 11$.

(a) What is the velocity of the particle at t = 0?

(b) During what time intervals is the particle moving to the left?

(c) What is the total distance traveled by the particle from t = 0 to t= 2?

2. 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 $x(t) = (t - 1)^3 (2t - 3)$.

(a) Find the velocity of the particle at any time $t \geq 0$.

(b) For what values of t is the velocity of the particle less than zero?

(c) Find the values of t when the particle is moving and the acceleration is zero.

3. A particle moves on the x-axis so that its position at any time $t \geq 0$ is given by $x(t) = 2te^{-t}$.

(a) Find the acceleration of the particle at $t = 0$.

(b) Find the velocity of the particle when its acceleration is 0.

(c) Find the total distance traveled by the particle from $t = 0$ to $t = 5$.

4. A particle moves along the x-axis so that at any time $t > 0$ its velocity is given by $v(t) = t \ln t - t$.

(a) Write an expression for the acceleration of the particle.

(b) For what values of t is the particle moving to the right?

(c) What is the minimum velocity of the particle? Show the analysis that leads to your conclusion.