Parametric (Speed)

84. A particle moves in the xy-plane so that its position at any time t is given by $x(t) = t^2$ and $y(t) = \sin(4t)$. What is the speed of the particle when t = 3?

A) 2.909 B) 3.062 C) 6.884 D) 9.016 E) 47.393

2011 BC1

At time t, a particle moving in the xy-plane is at position (x(t), y(t)), where x(t) and y(t) are not explicitly given. For $t \geq 0$, $\frac{dx}{dt} = 4t+1$ and $\frac{dy}{dt} = \sin(t^2)$. At time t = 0, x(0) = 0 and y(0) = -4.

Find the speed of the particle at time t = 3.

Find the slope of the line tangent to the path of the particle at time t = 3.

Find the position of the particle at time t = 3.

Find the acceleration vector of the particle at time t = 3.

Find the total distance traveled by the particle over the time interval $0 \leq t \leq 3$.

2010 #3 BC

A particle is moving along a curve so that its position at time t is, where $x(t) = t^2 - 4t + 8$ and $y(t)$ is not explicitly given. Both x and y are measured in meters, and t is measured in seconds. It is known that $\frac{dy}{dt} = te^{t-3} - 1$.

Find the speed of the particle at time t = 3 seconds.

Find the time t, $0 \le t \le 4$, when the line tangent to the path of the particle is horizontal. Is the direction of the particle toward the left or toward the right at that time. Give a reason for your answer.

There is a point with x-coordinate 5 through which the particle passes twice. Find each of the following.

a) The two values of t when that occurs.

b) The slopes of the lines tangent to the particles path at that point

c) The y-coordinate of that point, given $y(2) = 3 + \frac{1}{e}$

Find the total distance traveled by the particle for $0 \le t \le 4$ seconds.