The function $t = f(A)$ models the time, in minutes, for a chemical reaction to occur as a function of the amount A of catalyst used, measured in milliliters. What are the units for $f''(A)$?

A minutes per milliliter

B milliliters per minute

C minutes per milliliter per milliliter

D milliliters per minute per minute

The function Q defined above models the electric charge, measured in coulombs, inside a lightbulb t seconds after it is turned on. Which of the following presents the method for finding the instantaneous rate of change of the lightbulb's electric charge, in coulombs per second, at time $t = 4$?

(A) $Q''(4) = -0.213$ 2nd der.

(B) $Q'(4) = -0.171$

(C) $\frac{Q(4)-Q(0)}{4-0} = 0.053$ avg. r.o.c.

(D) $Q(4) = 0.194$ input/output

The function C gives the cost, in dollars, to produce a particular product, where $C(x)$ is the cost, in dollars, to produce x units of the product. The function M defined by $M(x) = C(x+1) - C(x)$ gives the marginal cost, in dollars, to produce unit number $x+1$. Which of the following gives the best estimate for the marginal cost, in dollars, to produce the 57th unit of the product?

rate of a specific product in the sequence

A $\frac{C(56)}{56}$ X

B $\frac{C(57)}{57} - \frac{C(56)}{56}$ X

C $C'(56)$

D $C'(57) - C'(56)$ X

An object moves along a straight line so that at any time t, for $0 \leq t \leq 8$, its position is given by $x(t) = 5 + 4t - t^2$. For what value of t is the object at rest?

A $t = 2$

B $t = 4$

C $t = \frac{9}{2}$

D $t = 5$

$V(t) = 0 \qquad x'(t)$

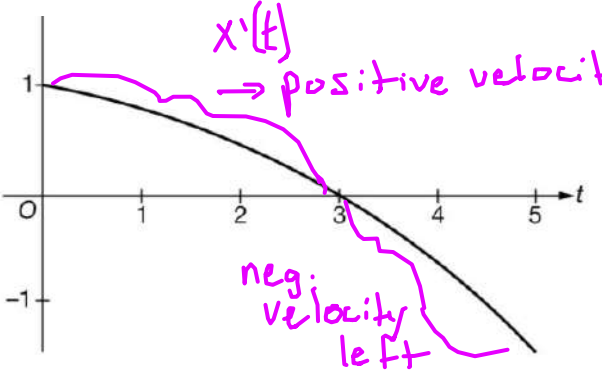
$x'(t) = 0 + 4 - 2t$

$4 - 2t = 0$

$-4 \qquad -4$

$\frac{-2t}{-2} = \frac{-4}{2}$

$t = 2$



A particle traveling on the x-axis has position $x(t)$ at time t. The graph of the particle's velocity $v(t)$ is shown above for $0 \le t \le 5$. Which of the following expressions gives the total distance traveled by the particle over the time interval $0 \le t \le 5$?

A $x(0) - x(5)$ ✗

B $x(5) - x(0)$ ✗

C $(x(3) - x(0)) + (x(3) - x(5))$ ✓

D $(x(0) - x(3)) + (x(5) - x(3))$

A particle moves along the x-axis so that at any time $t \geq 0$ its position is given by $x(t) = \frac{1}{2}(a-t)^2$, where a is a positive constant. For what values of t is the particle moving to the right?

A The particle is moving to the right only if $0 < t < a$.

B The particle is moving to the right only if $a < t$.

C The particle is moving to the right only if $t = a$.

D The particle is not moving to the right.

$$x(t) = \frac{(a-t)^2}{2}$$

$$x'(t) = \frac{2(a-t) \cdot \frac{d}{dx}(a-t)}{2}$$

$$= (a-t) \cdot \frac{d}{dx}(a) - \frac{d}{dx}(t)$$

$$= (a-t)(0-1) = 0 - a + 0 + t$$

$$x'(t) = t - a$$