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1. **[–/1 Points]**   **DETAILS**   **SCALCET9 2.7.001.**

A curve has equation $y = f(x)$.

(a)   Write an expression for the slope of the secant line through the points $P(4, f(4))$ and $Q(x, f(x))$.

    ○ $\dfrac{x - 4}{f(x) - f(4)}$

    ○ $\dfrac{f(x) - x}{f(4) - 4}$

    ○ $\dfrac{f(4) - 4}{f(x) - x}$

    ○ $\dfrac{f(x) - f(4)}{x - 4}$

(b)   Write an expression for the slope of the tangent line at P.

    ○ $\displaystyle\lim_{x \to 4} \dfrac{x - 4}{f(x) - f(4)}$

    ○ $\displaystyle\lim_{x \to 4} \dfrac{f(x) - f(4)}{x - 4}$

    ○ $\displaystyle\lim_{x \to 4} \dfrac{f(x) - x}{f(4) - 4}$

    ○ $\displaystyle\lim_{x \to 0} \dfrac{f(x) - f(4)}{x - 4}$
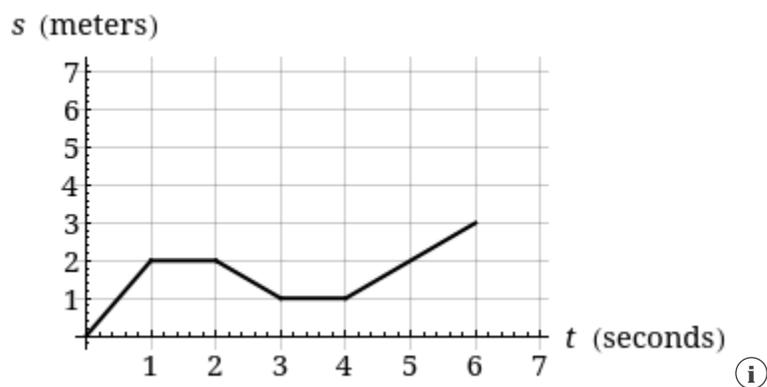
Need Help?   [Watch It]

2. **[–/2 Points]**   **DETAILS**   **SCALCET9 2.7.015.**

A particle starts by moving to the right along a horizontal line; the graph of its position function is shown in the figure.

(a) When is the particle moving to the right? (Select all that apply.)

☐ (0, 1)

☐ (1, 2)

☐ (2, 3)

☐ (3, 4)

☐ (4, 6)

When is the particle moving to the left? (Select all that apply.)

☐ (0, 1)

☐ (1, 2)

☐ (2, 3)

☐ (3, 4)

☐ (4, 6)

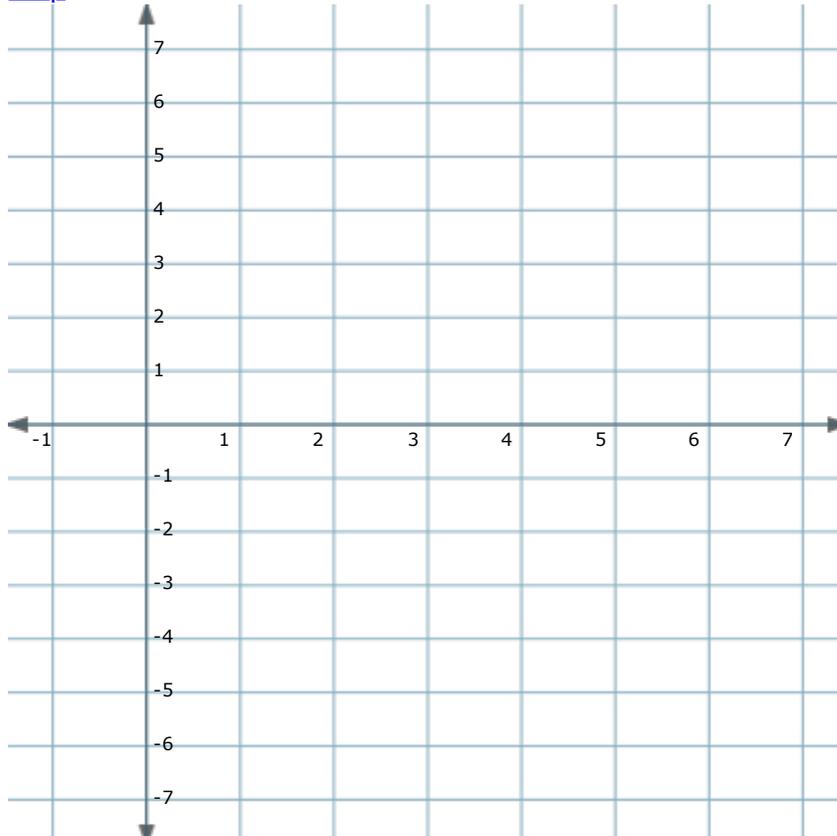When is the particle standing still? (Select all that apply.)

☐ (0, 1)

☐ (1, 2)

☐ (2, 3)

☐ (3, 4)

☐ (4, 6)

(b) Draw a graph of the velocity function.

○ Selection Tool
○ Line
○ Ray
○ Segment
○ Circle
○ Vertical Parabola
○ Horizontal Parabola
○ Point

No Solution
Help

Clear Graph
Delete Layer
Fill

WebAssign Graphing Tool

Graph LayersToggle Open/Closed

- After you add an object to the graph you can use Graph Layers to view and edit its properties.
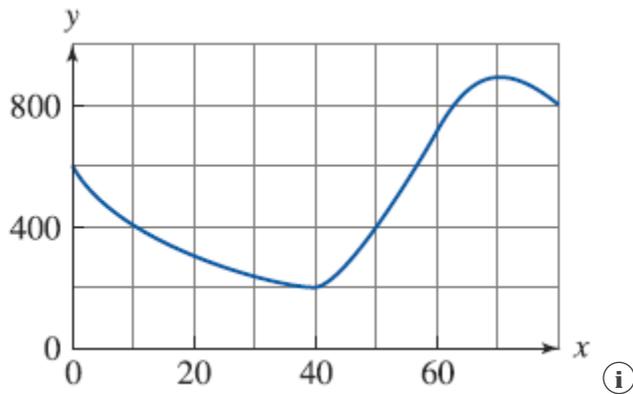
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3. **[–/2 Points]**   **DETAILS**   SCALCET9 2.7.018.

The graph of a function *f* is shown.

(a) Find the average rate of change of *f* on the interval [50, 60].

[   ]

(b) Identify an interval on which the average rate of change of *f* is 0.

○ [0, 80]

○ [10, 40]

○ [20, 40]

○ [0, 60]

○ [10, 50]

(c) Compute the following.

$$\frac{f(40) - f(0)}{40 - 0}$$

[   ]

What does this value represent geometrically?

○ the slope of the tangent line at (40, *f*(40))

○ the slope of the line segment from (0, *f*(0)) to (40, *f*(40))

○ the slope of the tangent line at (20, *f*(20))

○ the slope of the tangent line at (0, *f*(0))

(d) Estimate the value of *f*′(50).

[   ]

(e) Is *f*′(10) > *f*′(30)?

○ Yes

○ No

(f)   Is $f'(60) > \dfrac{f(80) - f(40)}{80 - 40}$?

○ Yes

○ No

Explain.

○ The slope of the tangent line at $x = 80$, $f'(80)$, is less than the slope of the line passing through $(40, f(40))$ and $(60, f(60))$.

○ The slope of the tangent line at $x = 60$, $f'(60)$, is less than the slope of the line passing through $(40, f(40))$ and $(80, f(80))$.

○ The slope of the tangent line at $x = 40$, $f'(40)$, is less than the slope of the line passing through $(60, f(60))$ and $(80, f(80))$.

○ The slope of the tangent line at $x = 80$, $f'(80)$, is greater than the slope of the line passing through $(40, f(40))$ and $(60, f(60))$.

○ The slope of the tangent line at $x = 60$, $f'(60)$, is greater than the slope of the line passing through $(40, f(40))$ and $(80, f(80))$.

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4. [–/2 Points]   **DETAILS**   SCALCET9 2.7.AE.004.

EXAMPLE 4

Video Example 🔊

Find the derivative of the function $f(x) = x^2 - 5x + 8$ at the numbers (a) 3 and (b) a.

SOLUTION

(a) From this definition we have the following.

$$f'(3) = \lim_{h \to 0} \frac{f(3+h) - f(3)}{h}$$

$$= \lim_{h \to 0} \frac{\left[\left(\boxed{}\atop{\boxed{}}\right) - 5(3+h) + 8\right] - [(3)^2 - 5(3) + 8]}{h}$$

$$= \lim_{h \to 0} \frac{9 + \left(\boxed{}\atop{\boxed{}}\right) - 15 - 5h + 8 - 2}{h}$$

$$= \lim_{h \to 0} \frac{\boxed{}}{\boxed{} \atop h}$$

$$= \lim_{h \to 0} \frac{\left(\boxed{}\atop{\boxed{}}\right)}{}$$

$$= \frac{\boxed{}}{\boxed{}}$$

(b)

$$f'(a) = \lim_{h \to 0} \frac{f(a + h) - f(a)}{h}$$

$$= \lim_{h \to 0} \frac{\left[\left(\boxed{} \over \boxed{} \right) - 5(a + h) + 8\right] - [a^2 - 5a + 8]}{h}$$

$$= \lim_{h \to 0} \frac{a^2 + \left(\boxed{} \over \boxed{} \right) - 5a - 5h + 8 - a^2 + 5a - 8}{h}$$

$$= \lim_{h \to 0} \frac{\boxed{} \over \boxed{}}{h}$$

$$= \lim_{h \to 0} \left(\boxed{} \over \boxed{} \right)$$

$$= \boxed{} \over \boxed{}$$

$$f'(a) = f'(3) =$$

$$\boxed{}$$

$$\boxed{}$$

As a check on our work in part (a), notice that if we let $a = 3$, then .

5. **[–/1 Points]**   **DETAILS**   **SCALCET9 2.8.022.**

Find the derivative of the function using the definition of derivative.

$$f(x) = mx + b$$

$f'(x) =$

State the domain of the function. (Enter your answer using interval notation.)

State the domain of its derivative. (Enter your answer using interval notation.)

6. **[–/2 Points]**   **DETAILS**   SCALCET9 2.8.023.

Find the derivative of the function using the definition of derivative.

$$f(t) = 3.5t^2 + 2t$$

$f'(t) =$

State the domain of the function. (Enter your answer using interval notation.)

State the domain of its derivative. (Enter your answer using interval notation.)

Need Help?   Watch It