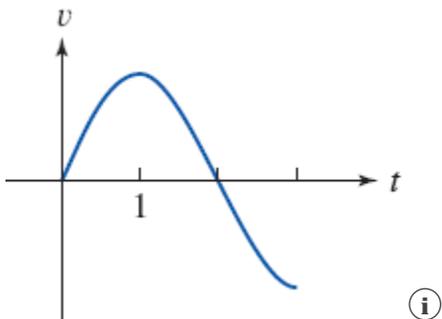1. **[–/4 Points]**   **DETAILS**   SCALCET9 3.7.005.

Graphs of the *velocity* functions of two particles are shown, where *t* is measured in seconds.
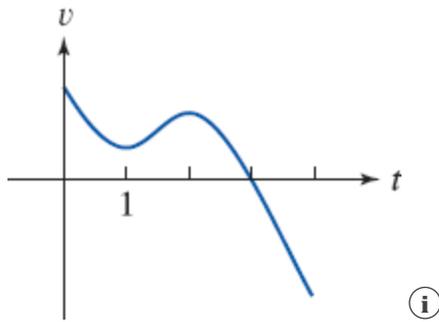
(a)

When is the particle speeding up? (Enter your answer using interval notation.)

When is the particle slowing down? (Enter your answer using interval notation.)

(b)

When is the particle speeding up? (Enter your answer using interval notation.)

[   ]

[   ]

When is the particle slowing down? (Enter your answer using interval notation.)

[   ]

[   ]

Need Help?   [Watch It]

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2. **[–/2.5 Points]**   **DETAILS**   **SCALCET9 3.7.010.MI.**

If a ball is thrown vertically upward with an initial velocity of 96 ft/s, then its height after t seconds is $s = 96t - 16t^2$. (Consider up to be the positive direction.)

(a) What is the maximum height (in ft) reached by the ball?

[   ] ft

(b) What is the velocity (in ft/s) of the ball when it is 128 ft above the ground on its way up?

[   ] ft/s

What is the velocity (in ft/s) of the ball when it is 128 ft above the ground on its way down?

[   ] ft/s

Need Help?   [Watch It]   [Master It]

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3. **[–/3.5 Points]**   **DETAILS**   SCALCET9 3.7.015.

(a) Find the average rate of change of the area of a circle with respect to its radius r as r changes from 3 to each of the following.

(i) 3 to 4

\
\

(ii) 3 to 3.5

\
\

(iii) 3 to 3.1

\
\

(b) Find the instantaneous rate of change when $r = 3$.

$A'(3) =$

\
\

Need Help?   [Watch It]

4. **[–/2.5 Points]**   **DETAILS**   SCALCET9 3.7.017.

A spherical balloon is being inflated. Find the rate (in ft^2/ft) of increase of the surface area ($S = 4\pi r^2$) with respect to the radius r when r is each of the following.

(a) 2 ft

[   ]

[   ]

ft^2/ft

(b) 3 ft

[   ]

[   ]

ft^2/ft

(c) 7 ft

[   ]

[   ]

ft^2/ft

Need Help? [Watch It]

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5. **[–/2.5 Points]**   **DETAILS**   SCALCET9 3.7.018.

The volume V of a growing spherical cell is $V = \dfrac{4}{3}\pi r^3$, where the radius r is measured in micrometers (1 μm = 10^{-6} m).

(a) Find the average rate of change of V with respect to r (in $\mu m^3/\mu m$) when r changes from 3 μm to each of the following. (Round your answers to one decimal place.)

   (i)   3 to 6 μm

   [   ] $\mu m^3/\mu m$

   (ii)   3 to 4 μm

   [   ] $\mu m^3/\mu m$

   (iii) 3 to 3.1 μm

   [   ] $\mu m^3/\mu m$

(b) Find the instantaneous rate of change of V with respect to r (in $\mu m^3/\mu m$) when r = 3 μm. (Round your answer to one decimal place.)

   $V'(3)$ = [   ] $\mu m^3/\mu m$

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6. **[–/2.5 Points]**   **DETAILS**   SCALCET9 3.XP.7.005.

The cost, in dollars, of producing x yards of a certain fabric is

$$C(x) = 1,200 + 12x - 0.1x^2 + 0.0005x^3.$$

(a)   Find the marginal cost function.

$C'(x) =$

[   ]

[   ]

(b)   Find $C'(400)$ and explain its meaning. What does it predict?

$C'(400) =$ [   ] and this is the rate at which costs are increasing with respect to the production level when $x =$ [   ] . $C'(400)$ predicts the cost of producing the [---Select--- ∨] yard.

(c)   Compare $C'(400)$ with the cost of manufacturing the 401st yard of fabric. (Round your answers to two decimal places.)

The cost of manufacturing the 401st yard of fabric is
$C(401) - C(400) =$ [   ] $- 22,000 \approx$ [   ] , which is approximately $C'(400)$.

Need Help? [Watch It]

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7. **[–/2.5 Points]**   **DETAILS**   SCALCET9 3.7.011.

If a rock is thrown vertically upward from the surface of Mars with velocity of 25 m/s, its height (in meters) after t seconds is $h = 25t - 1.86t^2$.

(a)   What is the velocity (in m/s) of the rock after 3 s?

[   ] m/s

(b)   What is the velocity (in m/s) of the rock when its height is 35 m on its way up? On its way down? (Round your answers to two decimal places.)

up   [   ] m/s
down   [   ] m/s