

Student: Cole Lamers
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Instructor: Viktoriya Shcherban
Course: Calc 1 11:30 AM / Internet
(81749&81750) Shcherban

Assignment: 2.1 Rates of Change and Tangents to Curves

1. Find the average rate of change of the function over the given intervals.

$$f(x) = 8x^3 + 8; \quad \text{a)} [4,6], \quad \text{b)} [-4,4]$$

a) The average rate of change of the function $f(x) = 8x^3 + 8$ over the interval $[4,6]$ is .
(Simplify your answer.)

b) The average rate of change of the function $f(x) = 8x^3 + 8$ over the interval $[-4,4]$ is .
(Simplify your answer.)

2. Find the average rate of change of the function over the given interval.

$$f(t) = 3 + \cos t$$

- a. $\left[-\frac{\pi}{2}, 0 \right]$
b. $[0, 2\pi]$

a. The average rate of change over $\left[-\frac{\pi}{2}, 0 \right]$ is .
(Type an exact answer, using π as needed.)

b. The average rate of change over $[0, 2\pi]$ is .
(Type an exact answer, using π as needed.)

3. Find the average rate of change of the function over the given interval.

$$R(\theta) = \sqrt{4\theta + 1}; \quad [0, 2]$$

$$\frac{\Delta R}{\Delta \theta} = \boxed{1} \quad (\text{Simplify your answer.})$$

4. Find (a) the slope of the curve at the given point P, and (b) an equation of the tangent line at P.

$$y = -5 - 9x^2; \quad P(2, -41).$$

(a) The slope of the curve at P is .
(Simplify your answer.)

(b) The equation for the tangent line at P is .
(Type an equation.)

5. (a) Find the slope of the curve $y = x^2 - 2x - 3$ at the point $P(3,0)$ by finding the limit of the secant slopes through point P.

(b) Find an equation of the tangent line to the curve at $P(3,0)$.

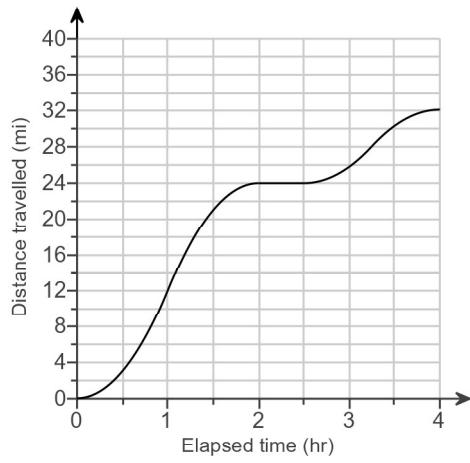
(a) The slope of the curve at $P(3,0)$ is . (Simplify your answer.)

(b) The equation of the tangent line to the curve at $P(3,0)$ is $y = \boxed{4x - 12}$.

6. (a) Find the slope of the curve $y = x^3 - 12x$ at the given point $P(1, -11)$ by finding the limiting value of the slope of the secants through P.
- (b) Find an equation of the tangent line to the curve at $P(1, -11)$.
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- (a) The slope of the curve at $P(1, -11)$ is - 9 .
- (b) The equation of the tangent line to the curve at $P(1, -11)$ is $y =$ - 9x - 2 .
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7.

The accompanying graph shows the total distance s traveled by a bicyclist after t hours.



Using the graph, answer parts (a) through (c).

(a) Which of the following is the bicyclist's average speed, in mph, over the time interval $[0, 1]$?

- A. 62 mph B. -62 mph
 C. 12 mph D. -12 mph

Which of the following is the bicyclist's average speed, in mph, over the time interval $[1, 2.5]$?

- A. 33 mph B. 8 mph
 C. -33 mph D. -8 mph

Which of the following is the bicyclist's average speed, in mph, over the time interval $[2.5, 3.5]$?

- A. 6 mph B. -6 mph
 C. 56 mph D. -56 mph

(b) Which of the following is the bicyclist's instantaneous speed, in mph, at $t = \frac{1}{2}$ hr?

- A. -62 mph B. -12 mph
 C. 62 mph D. 12 mph

Which of the following is the bicyclist's instantaneous speed, in mph, at $t = 2$ hrs?

- A. -1 mph B. 1 mph
 C. 0 mph D. 2 mph

Which of the following is the bicyclist's instantaneous speed, in mph, at $t = 3$ hrs?

- A. 32 mph B. -18 mph
 C. -32 mph D. 7 mph

(c) Which of the following choices gives the maximum speed, in mph, and the time at which it occurs?

- A. The maximum speed of the bicyclist is 49 mph and it occurs when $t = 1$ hr.
 B. The maximum speed of the bicyclist is 24 mph and it occurs when $t = 1$ hr.
 C. The maximum speed of the bicyclist is 49 mph and it occurs when $t = 3.5$ hrs.
 D. The maximum speed of the bicyclist is 24 mph and it occurs when $t = 3.5$ hrs.