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**Course:** Calc 1 11:30 AM / Internet  
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**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  $\pi$  as needed.)

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

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

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

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

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  $y = \text{  }.$

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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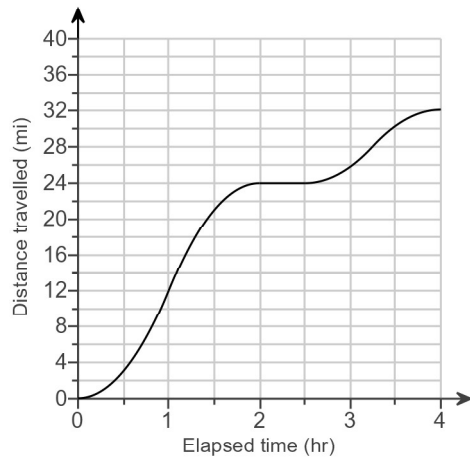
(a) The slope of the curve at  $P(1, -11)$  is .

(b) The equation of the tangent line to the curve at  $P(1, -11)$  is  $y =$  .

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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.