

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find a simplified difference quotient for the function.

1)  $f(x) = 7x + 4$

1) \_\_\_\_\_

2)  $f(x) = \frac{9}{x}$

2) \_\_\_\_\_

3)  $f(x) = x^3 + x$

3) \_\_\_\_\_

Complete the table after finding a simplified form of the difference quotient.

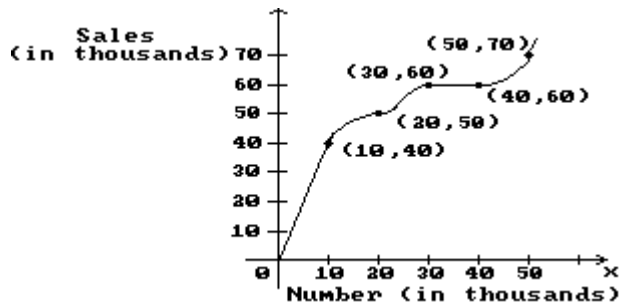
4) For the function  $f(x) = -7x^2$ , complete the table below:

4) \_\_\_\_\_

x	h	$\frac{f(x+h) - f(x)}{h}$
3	2	
3	1	
3	0.1	
3	0.01	

**Solve the problem.**

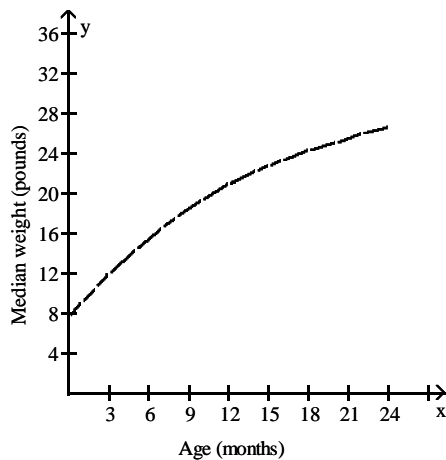
- 5) The graph shows the total sales in thousands of dollars from the distribution of  $x$  thousand catalogs. Find the average rate of change of sales with respect to the number of catalogs distributed for the change in  $x$ . 5) \_\_\_\_\_



10 to 30

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 6) The graph shows the median weight of girls between the ages of 0 and 24 months. 6) \_\_\_\_\_



Use the graph to find the average growth rate of a typical girl during the first two years of her life. Give your answer in pounds per month.

- A) 1.6 lb/month      B) 0.6 lb/month      C) 1.1 lb/month      D) 0.8 lb/month

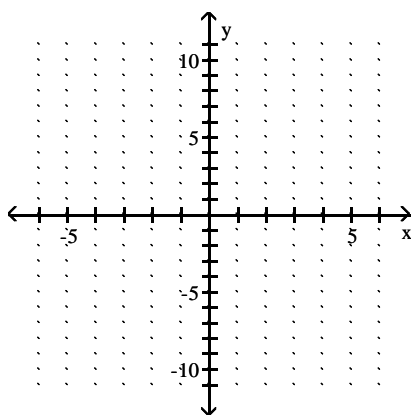
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 7) The average price of a ticket to a minor league baseball game can be approximated by 7) \_\_\_\_\_  
 $p(x) = 0.06x^2 + 0.41x + 6.31$ ,  
 where  $x$  is the number of years after 1990 and  $p(x)$  is in dollars.  
 (i) Find  $p(4)$ .  
 (ii) Find  $p(11)$ .  
 (iii) Find  $p(11) - p(4)$ .  
 (iv) Find  $\frac{p(11) - p(4)}{11 - 4}$ , and interpret this result.

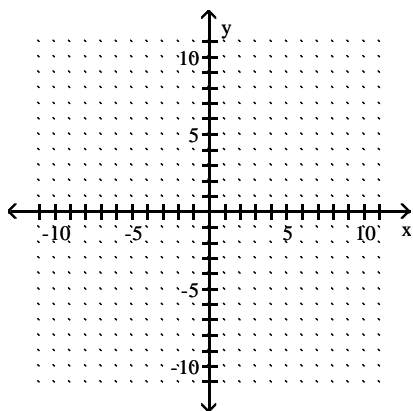
8) At the beginning of a trip, the odometer on a car reads 28,312 and the car has a full tank of gas. At the end of the trip the odometer reads 28,604 and there are 2.2 gallons remaining in the tank. The tank can hold a total of 11 gallons. What is the average rate of change of the number of miles with respect to the number of gallons? Assume that the tank was not filled during the trip. 8) \_\_\_\_\_

**Graph the function and the indicated tangent line.**

9) Graph  $f(x) = 4x^2$  and the tangent line to the graph at the point whose x-coordinate is 1. 9) \_\_\_\_\_



10) Graph  $f(x) = x^2 + 2x + 1$  and the tangent line to the graph at the point whose x-coordinate is 1. 10) \_\_\_\_\_



**Find the derivative of the function and evaluate the derivative at the given x-value.**

11)  $f(x) = x^2 + 5x$  at  $x = 4$  11) \_\_\_\_\_

12)  $f(x) = \frac{1}{4}x - \frac{1}{2}$  at  $x = 10$

12) \_\_\_\_\_

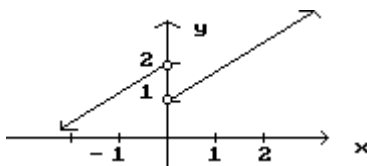
Find an equation for the line tangent to the graph of the given function at the indicated point.

13)  $f(x) = \frac{x^3}{2}$  at  $(5, 62.5)$

13) \_\_\_\_\_

List the  $x$ -values in the graph at which the function is not differentiable.

14)



14) \_\_\_\_\_

Find an equation for the line tangent to the graph of the given function at the indicated point.

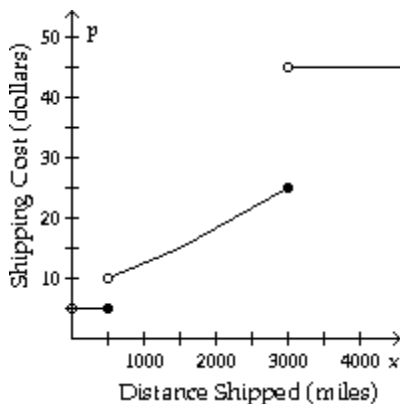
15)  $f(x) = x - x^2$  at  $(-1, -2)$

15) \_\_\_\_\_

Solve the problem.

- 16) Suppose that the cost,  $p$ , of shipping a 3-pound parcel depends on the distance shipped,  $x$ , according to the function  $p(x)$  depicted in the graph. At what values is the function  $p$  not differentiable?

16) \_\_\_\_\_



**Find the derivative.**

17)  $y = 4 - 5x^3$

17) \_\_\_\_\_

18)  $y = \frac{1}{2}x^6 - \frac{1}{4}x^4$

18) \_\_\_\_\_

19)  $y = 10x^{-2} + 5x^3 - 4x$

19) \_\_\_\_\_

20)  $y = \sqrt[4]{x^3}$

20) \_\_\_\_\_

21)  $f(x) = 5\sqrt{x} + \sqrt[3]{x} - 5\sqrt[4]{x} + 3\sqrt[5]{x}$

21) \_\_\_\_\_

22)  $y = \frac{7}{x} - \frac{x}{5}$

22) \_\_\_\_\_

**Find  $f'(a)$  for the given value of  $a$ .**

23)  $f(x) = 9x^{5/2} - 7x^{3/2}$ ,  $a = 4$

23) \_\_\_\_\_

24)  $f(x) = -8x^{-1} + 5x^{-2}$ ,  $a = 2$

24) \_\_\_\_\_

**Find the equation of the line tangent to the graph of the function at the indicated point.**

25)  $f(x) = x^2 - x$  at  $(-3, 12)$

25) \_\_\_\_\_

**Find all values of  $x$  (if any) where the tangent line to the graph of the function is horizontal.**

26)  $y = 2 + 8x - x^2$

26) \_\_\_\_\_

27)  $y = -0.01x^2 - 0.2x + 80$

27) \_\_\_\_\_

**For the given function, find the points on the graph at which the tangent line has slope 1.**

28)  $y = \frac{1}{3}x^3 - \frac{1}{2}x^2 + x$

28) \_\_\_\_\_

29)  $y = 17x - x^2$

29) \_\_\_\_\_

**Solve the problem.**

30) If the price (in dollars) of a product is given by  $P(x) = \frac{1024}{x} + 2200$ , where  $x$  represents the demand for the product, find the rate of change of price when the demand is 8 units.

30) \_\_\_\_\_

Answer Key

Testname: 2233 CHAPTER 3 SOME PRACTICE FOR THE EXAM WITH ANSWERS

1) 7

2)  $-\frac{9}{x^2 + xh}$

3)  $3x^2 + 3xh + h^2 + 1$

4)

x	h	$\frac{f(x+h) - f(x)}{h}$
3	2	-56
3	1	-49
3	0.1	-42.7
3	0.01	-42.07

5) 1

6) D

7) (i) \$8.91

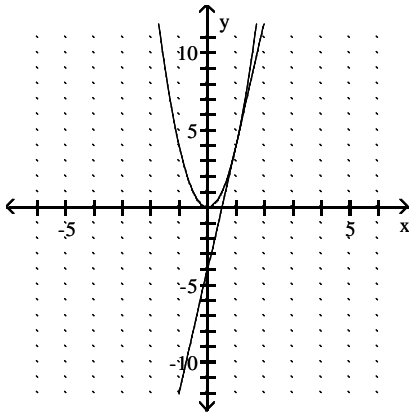
(ii) \$18.08

(iii) \$-9.17

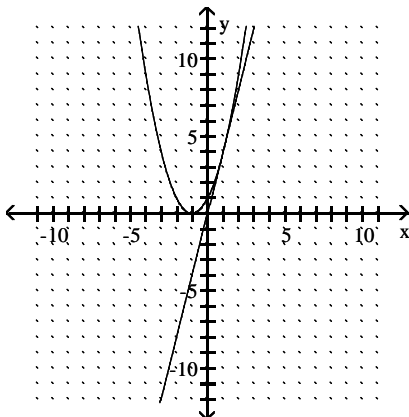
(iv) \$-1.31 is the average annual increase in ticket price from the 4th to the 11th year after 1990 (or from 1994 to 2001).

8) 33.18 miles/gal

9)



10)



11)  $f'(x) = 2x + 5; f'(4) = 13$

12)  $f'(x) = \frac{1}{4}; f'(10) = \frac{1}{4}$

## Answer Key

Testname: 2233 CHAPTER 3 SOME PRACTICE FOR THE EXAM WITH ANSWERS

13)  $y = \frac{75}{2}x - 125$

14)  $x = 0$

15)  $y = 3x + 1$

16) 500, 3000

17)  $\frac{dy}{dx} = -15x^2$

18)  $\frac{dy}{dx} = 3x^5 - x^3$

19)  $\frac{dy}{dx} = -20x^{-3} + 15x^2 - 4$

20)  $\frac{dy}{dx} = \frac{3}{4\sqrt{x}}$

21)  $f'(x) = \frac{5}{2}x^{-1/2} + \frac{1}{3}x^{-2/3} - \frac{5}{4}x^{-3/4} + \frac{3}{5}x^{-4/5}$

22)  $\frac{dy}{dx} = -\frac{7}{x^2} - \frac{1}{5}$

23) 159

24)  $\frac{3}{4}$

25)  $y = -7x - 9$

26) 4

27) -10

28) (0, 0) and  $\left(1, \frac{5}{6}\right)$

29) (8, 72)

30) -\$16/unit