

**Chapter 2 - Differentiation**

1. Find the slope of the tangent line to the graph of the function below at the given point.

$$f(x) = 4x - 2, (3, 10)$$

- a. 4
- b. -4
- c. -2
- d. 6
- e. none of the above

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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2. Find the slope of the tangent line to the graph of the function below at the given point.

$$f(x) = -3x^2 - 8, (-2, -20)$$

- a. 12
- b. -3
- c. -8
- d. -12
- e. none of the above

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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3. Find the slope of the tangent line to the graph of the function below at the given point.

$$f(x) = -2x^2 + 10, (3, -8)$$

- a. -12
- b. -2
- c. 10
- d. -18
- e. none of the above

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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4. Use the limit definition to find the slope of the tangent line to the graph of  $f(x) = \sqrt{4x + 61}$  at the point  $(5, 9)$ .

a.  $\frac{2}{9}$

b.  $\frac{2}{-9}$

c.  $\frac{1}{9}$

d.  $\frac{1}{-9}$

e.  $\frac{1}{5}$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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5. Find the derivative of the following function using the limiting process.

$$f(x) = 2x^2 - 6x$$

a. 2

b.  $4x - 6$

c.  $4x + 6$

d.  $4x$

e. none of the above

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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6. Find the derivative of the following function using the limiting process.

$$f(x) = \sqrt{7x - 5}$$

a.  $f'(x) = \frac{7}{2\sqrt{7x - 5}}$

b.  $f'(x) = -\frac{7}{2\sqrt{7x - 5}}$

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c.  $f'(x) = \frac{7}{2}(7x-5)^{1/2}$

d.  $f'(x) = -\frac{7}{\sqrt{7x-5}}$

e. either B or D

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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7. Find the derivative of the following function using the limiting process.

$$f(x) = \frac{6}{x-10}$$

a.  $f'(x) = \frac{6}{(x-10)^2}$

b.  $f'(x) = -\frac{6}{(x+10)^2}$

c.  $f'(x) = -\frac{6}{(x+10)}$

d.  $f'(x) = -\frac{6}{(x-10)^2}$

e. none of the above

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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8. Find an equation of the line that is tangent to the graph of  $f$  and parallel to the given line.

$$f(x) = 7x^2, \quad 28x - y + 4 = 0$$

a.  $y = 28x - 28$

b.  $y = 28x + 28$

c.  $y = -28x + 28$

d.  $y = -28x - 28$

e. none of the above

ANSWER: a

POINTS: 1

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9. Find an equation of the line that is tangent to the graph of  $f$  and parallel to the given line.

$$f(x) = 4x^3, \quad 108x - y + 3 = 0$$

a.  $y = -108x - 216$

b.  $y = 108x - 216$

c.  $y = -108x + 216$

d.  $y = 108x + 216$

e. both B and D

ANSWER: e

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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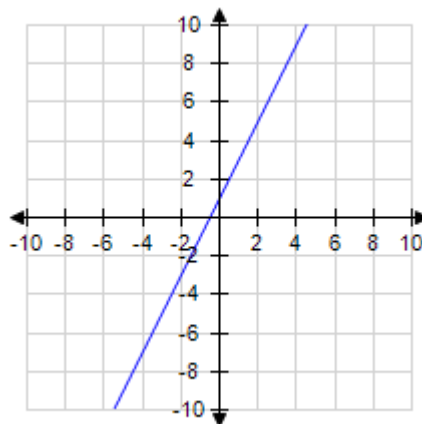
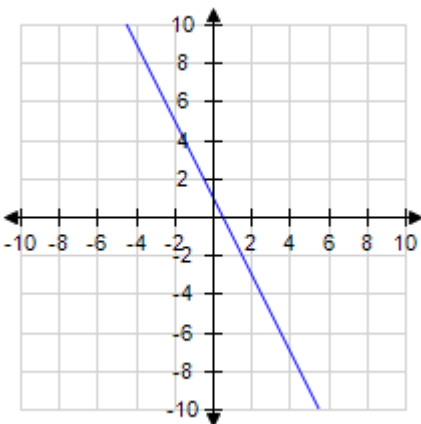
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10. Identify a function  $f(x)$  that has the given characteristics and then sketch the function.

$$f(0) = 1, \quad f'(x) = -2, \quad -\infty < x < \infty$$

a.  $f(x) = -2x + 1$

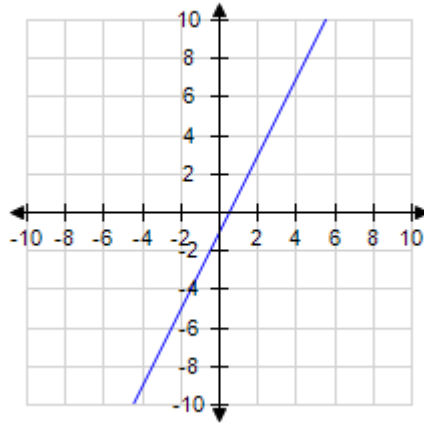
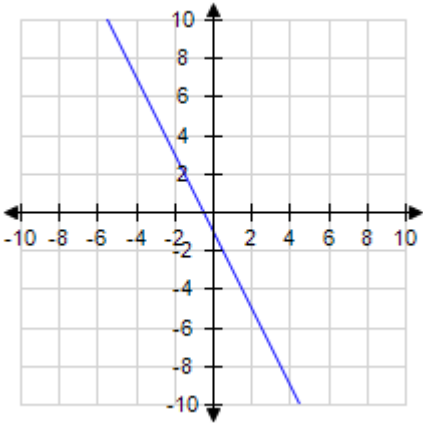
b.  $f(x) = 2x + 1$



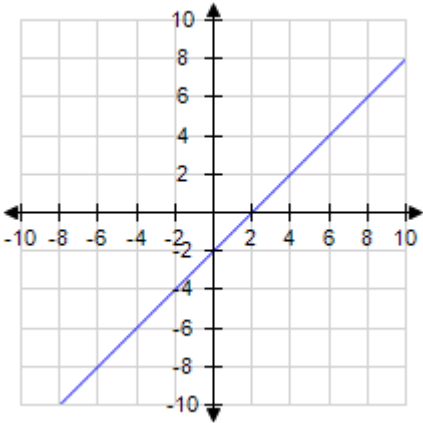
c.  $f(x) = -2x - 1$

d.  $f(x) = 2x - 1$

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e.  $f(x) = x - 2$



ANSWER: a

POINTS: 1

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HAS VARIABLES: True

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11. Find the derivative of the function.

$$f(x) = x^8$$

a.  $f'(x) = 8x^8$

b.  $f'(x) = 8x^7$

c.  $f'(x) = 7x^7$

d.  $f'(x) = 7x^9$

e. none of the above

ANSWER: b

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POINTS: 1

QUESTION TYPE: Multiple Choice

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12. Find the derivative of the function.

$$f(x) = -8x^3 + 2x^2 + 4$$

a.  $f'(x) = -24x^2 + 4x$

b.  $f'(x) = -16x^2 + 2x$

c.  $f'(x) = -16x + 2x^2$

d.  $f'(x) = -24x^2 + 4x + 4$

e. none of the above

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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13. For the function given, find  $f'(x)$ .

$$f(x) = x^5 - 9x - 3$$

a.  $x^4 - 9$

b.  $5x^4 - 3$

c.  $5x^4 - 9$

d.  $5x^5 - 9x$

e.  $x^5 - 9x - 3$

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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14. Find the derivative of the function.

$$f(x) = 12x^{16} + 2x^6 - 6x^3 + 18x - 2$$

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- a.  $180x^{15} + 10x^5 - 12x^2 + 18$
- b.  $192x^{16} + 12x^6 - 18x^3 + 18x$
- c.  $12x^{15} + 2x^5 - 6x^2 + 18$
- d.  $192x^{15} + 12x^5 - 18x^2 + 18$
- e.  $180x^{16} + 10x^6 - 12x^3 + 18x$

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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15. Find the derivative of the function  $h(x) = x^{\frac{6}{5}}$ .

a.  $h'(x) = \frac{6}{5}x^{\frac{11}{5}}$

b.  $h'(x) = -\frac{6}{5}x^{\frac{1}{5}}$

c.  $h'(x) = \frac{6}{5}x^{\frac{1}{5}}$

d.  $h'(x) = -\frac{6}{5}x^{\frac{11}{5}}$

e.  $h'(x) = \frac{6}{5}x^{-\frac{1}{5}}$

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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16. Find the derivative of the function  $s(x) = 8x^{-1} + 6$ .

a.  $s'(x) = \frac{8}{x^2}$

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b.  $s'(x) = -\frac{8}{x^2}$

c.  $s'(x) = -\frac{8}{x^2} + 6$

d.  $s'(x) = \frac{8}{x^2} + 6$

e.  $s'(x) = 8x^{-2}$

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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17. Find the derivative of the function.

$$f(x) = \frac{1}{x^4}$$

a.  $f'(x) = -\frac{3}{x^5}$

b.  $f'(x) = -\frac{4}{x^3}$

c.  $f'(x) = -\frac{4}{x^5}$

d.  $f'(x) = -\frac{5}{x^5}$

e. none of the above

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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18. Differentiate the given function.

$$y = \frac{7}{8x^8}$$

a.  $-\frac{56}{x^9}$



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b.  $-\frac{7}{x^8}$

c.  $-\frac{56}{x^8}$

d.  $-\frac{7}{x^9}$

e.  $-\frac{8}{x^9}$

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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19. Differentiate the given function.

$$y = \frac{7}{(6x)^6}$$

a.  $\frac{252}{(6x)^7}$

b.  $-\frac{42}{(6x)^7}$

c.  $-\frac{252}{(6x)^7}$

d.  $\frac{42}{(6x)^7}$

e.  $-\frac{42}{(6x)^5}$

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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20. Determine the point(s), (if any), at which the graph of the function has a horizontal tangent.

$$y(x) = x^4 - 108x + 4$$

a. 0

b. 0 and 3

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c. 0 and  $-3$

d. 3

e. There are no points at which the graph has a horizontal tangent.

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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21. The graph shows the number of visitors  $V$  to a national park in hundreds of thousands during a one-year period, where  $t = 1$  represents January. Estimate the rate of change of  $V$  over the interval  $[5, 7]$ . Round your answer to the nearest hundred thousand visitors per year.



a. 187.5 hundred thousand visitors per year

b. 281.25 hundred thousand visitors per year

c. 225 hundred thousand visitors per year

d. 562.5 hundred thousand visitors per year

e. 1125 hundred thousand visitors per year

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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22. Find the marginal cost for producing  $x$  units. (The cost is measured in dollars.)

$$C = 205,000 + 9,800x$$

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- a. \$9,800
- b. \$9,850
- c. \$8,800
- d. \$8,850
- e. \$9,750

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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23. Find the marginal revenue for producing  $x$  units. (The revenue is measured in dollars.)

$$R = 50x - 0.5x^2$$

- a.  $50 - x$  dollars
- b.  $50 + x$  dollars
- c. 50 dollars
- d.  $50 - 0.5x$  dollars
- e.  $50 + 0.5x$  dollars

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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24. Find the marginal profit for producing  $x$  units. (The profit is measured in dollars.)

$$P = -2x^2 + 72x - 145$$

- a.  $-4x + 72$  dollars
- b.  $4x + 72$  dollars
- c.  $-4x - 72$  dollars
- d.  $4x - 72$  dollars
- e.  $-2x + 72$  dollars

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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25. The cost  $C$  (in dollars) of producing  $x$  units of a product is given by  $C = 3.6\sqrt{x} + 500$ . Find the additional cost when the production increases from 9 to 10. Round your answer to two decimal places.

- a. \$0.58
- b. \$0.36
- c. \$0.62
- d. \$0.12
- e. \$0.64

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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26. The profit (in dollars) from selling  $x$  units of calculus textbooks is given by  $P = -0.05x^2 + 30x - 2,000$ . Find the additional profit when the sales increase from 146 to 147 units. Round your answer to two decimal places.

- a. \$15.35
- b. \$30.00
- c. \$15.45
- d. \$30.80
- e. \$30.60

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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27. The profit (in dollars) from selling  $x$  units of calculus textbooks is given by  $P = -0.05x^2 + 20x - 2,000$ . Find the marginal profit when  $x = 150$ . Round your answer to two decimal places.

- a. \$35.00
- b. \$20.00
- c. \$5.00
- d. \$-125.00
- e. \$-130.05

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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28. The population  $P$  ( in thousands) of Japan from 1980 through 2010 can be modeled by

$P = -15.56t^2 + 802.1t + 117,001$  where  $t$  is the year, with  $t = 0$  corresponding to 1980. Determine the population

growth rate,  $\frac{dP}{dt}$  .

a.  $\frac{dP}{dt} = -31.12t + 802.1$

b.  $\frac{dP}{dt} = 31.12t + 802.1$

c.  $\frac{dP}{dt} = -31.12t - 802.1$

d.  $\frac{dP}{dt} = 31.12t - 802.1$

e.  $\frac{dP}{dt} = -31.12 + 802.1t$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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29. When the price of a glass of lemonade at a lemonade stand was \$1.75, 400 glasses were sold. When the price was lowered to \$1.50, 500 glasses were sold. Assume that the demand function is linear and that the marginal and fixed costs are \$0.10 and \$25, respectively. Find the profit  $P$  as a function of  $x$ , the number of glasses of lemonade sold.

a.  $P = -0.0025x^2 + 2.65x - 25$

b.  $P = 0.0025x^2 + 2.65x - 25$

c.  $P = -0.0025x^2 + 2.65x + 25$

d.  $P = 0.0025x^2 - 2.65x - 25$

e.  $P = 0.0025x^2 + 2.65x + 25$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

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30. When the price of a glass of lemonade at a lemonade stand was \$1.75, 400 glasses were sold. When the price was lowered to \$1.50, 500 glasses were sold. Assume that the demand function is linear and that the marginal and fixed costs are \$0.10 and \$ 25, respectively. Find the marginal profit when 300 glasses of lemonade are sold and when 700 glasses of lemonade are sold.

- a.  $P'(300) = 1.15$ ,  $P'(700) = -0.85$
- b.  $P'(300) = -0.85$ ,  $P'(700) = 1.15$
- c.  $P'(300) = 1.15$ ,  $P'(700) = 0.85$
- d.  $P'(300) = 0.85$ ,  $P'(700) = -1.15$
- e.  $P'(300) = -1.15$ ,  $P'(700) = -0.85$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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31. Use the product Rule to find the derivative of the function  $f(x) = x(x^2 + 3)$ .

- a.  $f'(x) = 3x^2 + 3$
- b.  $f'(x) = 3x^2 + 1$
- c.  $f'(x) = x^2 + 3$
- d.  $f'(x) = 3x^2 - 3$
- e.  $f'(x) = 3x^2 - 1$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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32. Find the derivative of the function  $f(x) = \frac{x^3 + 6x}{3}$ .

- a.  $f'(x) = x^2 + 2$
- b.  $f'(x) = x^2 + 6$
- c.  $f'(x) = x^2 + 2x$
- d.  $f'(x) = x^2 + x$
- e.  $f'(x) = x^2 - 2x$

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ANSWER: a  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: False  
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33. Find the derivative of the function  $f(x) = \frac{x^2 - x - 20}{x + 4}$ . State which differentiation rule(s) you used to find the derivative.

- a. 1, Product Rule.
- b. 1, Quotient Rule.
- c. 5, Product Rule.
- d. 5, Quotient Rule.
- e.  $x + 3$ , Product Rule.

ANSWER: b  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: False  
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34. Find the point(s), if any, at which the graph of  $f$  has a horizontal tangent line.

$$f(x) = \frac{x^2}{x - 1}$$

- a. (0, 0), (2, 4)
- b. (0, 2), (0, 4)
- c. (4, 0), (2, 0)
- d. (0, 4), (2, 0)
- e. (0, 0), (4, 2)

ANSWER: a  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: False  
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35. A population of bacteria is introduced into a culture. The number of bacteria  $P$  can be modeled by  $P = 500 \left( 1 + \frac{4t}{50+t} \right)$  where  $t$  is the time (in hours). Find the rate of change of the population when  $t = 2$ .

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- a. 36.98 bacteria/hr
- b. 29.15 bacteria/hr
- c. 33.65 bacteria/hr
- d. 32.75 bacteria/hr
- e. 30.25 bacteria/hr

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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36. Use the given information to find  $f'(2)$  of the function  $f(x) = g(x) \cdot h(x)$ .

$$g(2) = 3, g'(2) = -2, h(2) = -1 \text{ and } h'(2) = 4$$

- a.  $f'(2) = 14$
- b.  $f'(2) = -11$
- c.  $f'(2) = 17$
- d.  $f'(2) = -9$
- e.  $f'(2) = 12$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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37. Find an equation of the tangent line to the graph of  $f$  at the given point.

$$f(t) = (t - 4)(t^2 - 5), \text{ at } (2, 2)$$

- a.  $y = 9t + 20$
- b.  $y = 16t - 9$
- c.  $y = -9t - 16$
- d.  $y = -9t + 20$
- e.  $y = -9 + 20t$

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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38. Find an equation of the tangent line to the graph of  $f$  at the given point.

$$f(x) = (x - 3)(x^2 - 4), \text{ at } (1, 6)$$

- a.  $y = 7x + 13$
- b.  $y = 1x - 7$
- c.  $y = -7x - 1$
- d.  $y = -7x + 13$
- e.  $y = -7 + 13x$

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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39. Use the demand function  $x = 325\left(1 - \frac{2p}{7p + 2}\right)$  to find the rate of change in the demand  $x$  for the given price  $p = 4.00$ . Round your answer to two decimal places.

- a. 1.44 units per dollar
- b. -0.72 units per dollar
- c. 0.72 units per dollar
- d. 0.96 units per dollar
- e. -1.44 units per dollar

ANSWER: e

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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40. A population of bacteria is introduced into a culture. The number of bacteria  $P$  can be modeled by

$$P = 300\left(1 + \frac{3t}{50 + t^2}\right) \text{ where } t \text{ is the time (in hours). Find the rate of change of the population when } t = 3.$$

- a. 21.95 bacteria/hr
- b. 3.53 bacteria/hr
- c. 10.6 bacteria/hr
- d. 2.07 bacteria/hr
- e. 7.32 bacteria/hr

ANSWER: c

POINTS: 1

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41. Find  $\frac{dy}{du}$ ,  $\frac{du}{dx}$ , and  $\frac{dy}{dx}$  of the functions  $y = u^2$ ,  $u = 4x + 7$ .

a.  $\frac{dy}{du} = 2u$ ,  $\frac{du}{dx} = 4$ , and  $\frac{dy}{dx} = 32x + 56$

b.  $\frac{dy}{du} = 2u$ ,  $\frac{du}{dx} = 2$ , and  $\frac{dy}{dx} = 16x + 49$

c.  $\frac{dy}{du} = 4u$ ,  $\frac{du}{dx} = 4$ , and  $\frac{dy}{dx} = 32x + 56$

d.  $\frac{dy}{du} = 4u$ ,  $\frac{du}{dx} = 2$ , and  $\frac{dy}{dx} = 32x + 56$

e.  $\frac{dy}{du} = 2u$ ,  $\frac{du}{dx} = 4$ , and  $\frac{dy}{dx} = 16x + 49$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

DATE CREATED: 1/21/2016 10:02 AM

DATE MODIFIED: 1/21/2016 10:02 AM

42. Find  $\frac{dy}{dx}$  of  $y = \sqrt{u}$ ,  $u = 6 + x^2$ .

a.  $\frac{-x}{\sqrt{6+x^2}}$

b.  $\frac{1}{2\sqrt{6+x^2}}$

c.  $\frac{x}{\sqrt{6+x^2}}$

d.  $-\frac{1}{2\sqrt{6+x^2}}$

e. none of these choices

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

## Chapter 2 - Differentiation

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43. Find the derivative of the function.

$$f(t) = (2 + 5t)^{\frac{6}{7}}$$

a.  $f'(t) = \frac{2}{7}(2 + 5t)^{-\frac{1}{7}}$

b.  $f'(t) = \frac{31}{7}(2 + 5t)^{-\frac{1}{7}}$

c.  $f'(t) = \frac{1}{7}(2 + 5t)^{-\frac{1}{7}}$

d.  $f'(t) = \frac{5}{7}(2 + 5t)^{-\frac{1}{7}}$

e.  $f'(t) = \frac{30}{7}(2 + 5t)^{-\frac{1}{7}}$

ANSWER: e

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

DATE CREATED: 1/21/2016 10:02 AM

DATE MODIFIED: 3/30/2017 7:58 AM

44. Differentiate the given function.

$$y = \sqrt{9x^5 + 8x}$$

a.  $\frac{1}{2}(45x^4 + 8)^{-\frac{1}{2}}$

b.  $\frac{1}{2}(9x^5 + 8x)^{-\frac{1}{2}}$

c.  $\frac{1}{2}(45x^5 + 8x)^{-\frac{1}{2}}(9x^5 + 8)$

d.  $\frac{1}{2}(9x^5 + 8x)^{-\frac{1}{2}}(45x^4 + 8)$

## Chapter 2 - Differentiation

e.  $-\frac{1}{2}(9x^5 + 8x)^{-\frac{3}{2}}(45x^4 + 8)$

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

DATE CREATED: 1/21/2016 10:02 AM

DATE MODIFIED: 3/30/2017 8:00 AM

45. Find the derivative of the function.

$$f(x) = x^5(1 + 6x)^6$$

a.  $f'(x) = x^5(1 + 6x)^4(5 + 66x)$

b.  $f'(x) = 6x^5(1 + 6x)^5(5 + 66x)$

c.  $f'(x) = x^4(1 + 6x)^6(5 + 66x)$

d.  $f'(x) = x^4(1 + 6x)^5(5 + 66x)$

e.  $f'(x) = x^4(1 + 6x)^5(5 + 6x)$

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

DATE CREATED: 1/21/2016 10:03 AM

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46. Find the derivative of the given function.

$$c(x) = 9x\sqrt{x^5 + 3}$$

a.  $\frac{9(7x^5 - 6)}{2\sqrt{x^5 + 3}}$

b.  $\frac{9(5x^5 - 6)}{2\sqrt{x^5 + 3}}$

c.  $\frac{9(5x^5 - 6)}{\sqrt{x^5 + 3}}$

d.  $\frac{9(7x^5 + 6)}{2\sqrt{x^5 + 3}}$

## Chapter 2 - Differentiation

e.  $\frac{9(5x^5 + 6)}{\sqrt{x^5 + 3}}$

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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47. Find the derivative of the function.

$$f(x) = x^8 \sqrt{2 - 9x}$$

a.  $f'(x) = \frac{x^7(32 - 153x)}{2\sqrt{2 - 9x}}$

b.  $f'(x) = \frac{x^7(32 + 153x)}{2\sqrt{2 - 9x}}$

c.  $f'(x) = \frac{x^7(2 - 153x)}{2\sqrt{2 - 9x}}$

d.  $f'(x) = \frac{x^7(32 - 9x)}{2\sqrt{2 - 9x}}$

e.  $f'(x) = \frac{x^7(2 + 9x)}{2\sqrt{2 - 9x}}$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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48. Find the derivative of the function.

$$g(x) = \left( \frac{x + 5}{x^2 + 2} \right)^3$$

a.  $g'(x) = \frac{3(2 - 10x + x^2)}{(5 + x)(2 + x^2)} \left( \frac{5 + x}{2 + x^2} \right)^3$

b.  $g'(x) = \frac{3(2 + 10x - x^2)(5 + x)^2}{(2 + x^2)^4}$

## Chapter 2 - Differentiation

c. 
$$g'(x) = \frac{3(2 - 10x - x^2)(5 + x)^4}{(2 + x^2)^2}$$

d. 
$$g'(x) = -\frac{3(2 - 10x - x^2)(5 + x)^2}{(2 + x^2)^4}$$

e. 
$$g'(x) = \frac{3(2 - 10x - x^2)(5 + x)^2}{(2 + x^2)^4}$$

ANSWER: e

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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49. You deposit \$1,000 in an account with an annual interest rate of change  $r$  (in decimal form) compounded monthly. At the end of 4 years, the balance is  $A = 1,000\left(1 + \frac{r}{12}\right)^{48}$ . Find the rate of change of  $A$  with respect to  $r$  when  $r = 0.08$ .

. Round your answer to two decimal places.

- a. \$1,375.67
- b. \$65,594.67
- c. \$114.64
- d. \$5,466.22
- e. \$5,430.02

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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50. The value  $V$  of a machine  $t$  years after it is purchased is inversely proportional to the square root of  $t+2$ . The initial value of the machine is \$10,000. Find the rate of depreciation when  $t = 5$ . Round your answer to two decimal places.

- a. -381.80 per year
- b. -1,889.82 per year
- c. 447.21 per year
- d. 1,767.77 per year
- e. -763.60 per year

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

## Chapter 2 - Differentiation

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51. Find the second derivative of the function.

$$f(x) = 3x^{\frac{4}{7}}$$

a.  $f''(x) = \frac{-36}{49}x^{\frac{3}{7}}$

b.  $f''(x) = \frac{4}{49}x^{\frac{-10}{7}}$

c.  $f''(x) = \frac{147}{49}x^{\frac{-10}{7}}$

d.  $f''(x) = \frac{-36}{49}x^{\frac{-10}{7}}$

e. None of the above

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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52. Find the third derivative of the function  $f(x) = x^5 - 3x^4$ .

a.  $60x^2 - 72x$

b.  $30x^2 - 36x$

c.  $60x^2 - 72x^2$

d.  $60x^2 - 36x$

e.  $30x^2 - 72x$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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53. Find the  $f^{(6)}(x)$  of  $f^{(4)}(x) = (x^2 + 1)^2$ .

- a.  $12x^2 + 4$
- b.  $12x^2 + 2$
- c.  $6x^2 + 4$
- d.  $6x^2 + 2$
- e.  $12x^2 + 1$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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54. Determine whether the statement is true or false. If it is false, explain why or give an example that shows it is false.

If  $y = f(x) \cdot g(x)$ , then  $y' = f'(x) \cdot g'(x)$ .

- a. True
- b. False. The product rule is  $[f(x) \cdot g(x)]' = f(x) \cdot g'(x) + g(x) \cdot f'(x)$

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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55. Find the third derivative.

$$y = \frac{7}{x^7}$$

- a.  $\frac{2,646}{x^9}$
- b.  $\frac{3,528}{x^{10}}$
- c. 0
- d.  $\frac{504}{x^9}$
- e.  $-\frac{3528}{x^{10}}$

ANSWER: e



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POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
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56. Find the value  $g'''(7)$  for the function  $g(t) = 3t^5 + 8t^3 + 5$ .

- a. 20,916
- b. 37,191
- c. 53,170
- d. 37,196
- e. 184,779

ANSWER: a  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
DATE CREATED: 1/21/2016 10:03 AM  
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57. Find the indicated derivative.

Find  $y^{(4)}$  if  $y = x^9 - 11x^3$ .

- a.  $504x^6$
- b.  $504x^5$
- c.  $504x^5 - 66x$
- d.  $3,024x^6 - 66x$
- e.  $3,024x^5$

ANSWER: e  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
DATE CREATED: 1/21/2016 10:03 AM  
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58. Find the second derivative for the function  $f(x) = x^3 + 6x^2 - 33x - 26$  and solve the equation  $f'''(x) = 0$ .

- a. -2
- b. 1
- c. 0
- d. 26

## Chapter 2 - Differentiation

e. 33

ANSWER: a  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
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59. Find the second derivative for the function  $f(x) = \frac{2x}{2x+4}$  and solve the equation  $f''(x) = 0$ .

- a. 0
- b. 4
- c. -4
- d.  $-\frac{1}{4}$

e. no solution

ANSWER: e  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
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60. A brick becomes dislodged from the Empire State Building (at a height of 1,000 feet) and falls to the sidewalk below. Write the position  $s(t)$ , velocity  $v(t)$ , and acceleration  $a(t)$  as functions of time.

- a.  $s(t) = 16t^2 + 1,000$ ,  $v(t) = -32t$ ,  $a(t) = -32$
- b.  $s(t) = -16t^2 - 1,000$ ,  $v(t) = -32t$ ,  $a(t) = -32$
- c.  $s(t) = -16t^2 + 1,000$ ,  $v(t) = -32t$ ,  $a(t) = -32$
- d.  $s(t) = 16t^2 - 1,000$ ,  $v(t) = -32t$ ,  $a(t) = -32$
- e.  $s(t) = -16t^2 + 1,000$ ,  $v(t) = -32$ ,  $a(t) = -32$

ANSWER: c  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
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61. Find  $y'$  implicitly for  $2x^4 - y^4 = 7$ .

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a.  $y' = \frac{2x^4}{y^4}$

b.  $y' = \frac{y^4}{2x^4}$

c.  $y' = \frac{2x^3}{y^3}$

d.  $y' = \frac{y^3}{2x^3}$

e.  $y' = \frac{x^3}{2y^3}$

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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62. Find  $\frac{dy}{dx}$  for the equation  $\frac{4x + 7y}{7x - 3y} = 3$ .

a.  $\frac{dy}{dx} = -\frac{17}{16}$

b.  $\frac{dy}{dx} = \frac{25}{16}$

c.  $\frac{dy}{dx} = \frac{17}{16}$

d.  $\frac{dy}{dx} = -\frac{25}{16}$

e.  $\frac{dy}{dx} = 3$

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

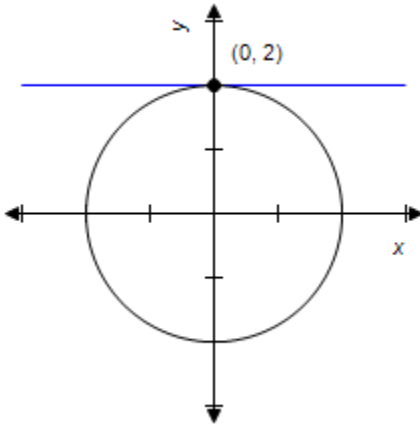
DATE CREATED: 1/21/2016 10:03 AM

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63. Find the slope of the graph at the given point.

$$x^2 + y^2 = 4$$

**Chapter 2 - Differentiation**



- a. 0
- b. 3
- c. 5
- d. 4
- e. 7

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

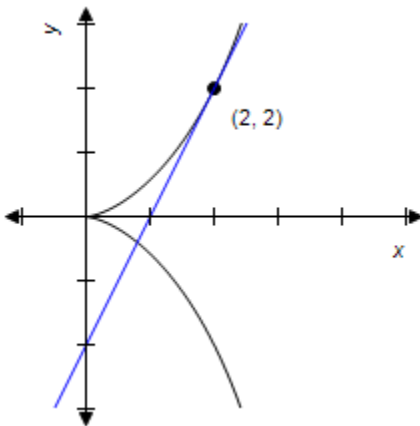
HAS VARIABLES: False

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64. Find the slope of the graph at the given point.

$$(4 - x)y^2 = x^3$$



- a. 2
- b. 0
- c. 1

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d. 3

e. 5

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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65. Find the rate of change of  $x$  with respect to  $p$ .

$$p = \frac{2}{0.00001x^3 + 0.1x}, x \geq 0$$

a.  $-\frac{2}{p^2(0.00003x^2 + 0.1)}$

b.  $-\frac{2}{p(0.00003x^2 + 0.1)}$

c.  $-\frac{2}{p^2x(0.00003x^2 + 0.1)}$

d.  $-\frac{2}{px(0.00003x^2 + 0.1)}$

e.  $-\frac{2x}{p^2(0.00003x^2 + 0.1)}$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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66. Find the rate of change of  $x$  with respect to  $p$ .

$$p = \sqrt{\frac{200-x}{2x}}, 0 < x \leq 200$$

a.  $-\frac{4xp}{2p^2 + 1}$

b.  $\frac{4xp}{2p^2 + 1}$

c.  $-\frac{4x}{2p^2 + 1}$

## Chapter 2 - Differentiation

d.  $\frac{4x}{2p^2 + 1}$

e.  $-\frac{4xp}{2p + 1}$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

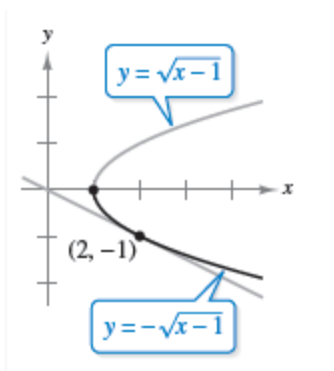
HAS VARIABLES: False

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67. Find  $\frac{dy}{dx}$  implicitly and explicitly (the explicit functions are shown on the graph) and show that the results are equivalent. Use the graph to estimate the slope of the tangent line at the labeled point. Then verify your result analytically by evaluating  $\frac{dy}{dx}$  at the point.

$$x - y^2 - 1 = 0$$



a.  $\frac{1}{2y} ; -\frac{1}{2}$

b.  $-\frac{1}{2y} ; \frac{1}{2}$

c.  $-\frac{1}{2y} ; -\frac{1}{2}$

d.  $\frac{1}{2y} ; \frac{1}{2}$

e.  $\frac{1}{2} ; -\frac{1}{2}$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

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68. Let  $x$  represent the units of labor and  $y$  the capital invested in a manufacturing process. When 135,540 units are produced, the relationship between labor and capital can be modeled by  $100 \cdot x^{0.75} \cdot y^{0.25} = 135,540$ . Find the rate of change of  $y$  with respect to  $x$  when  $x = 1,500$  and  $y = 1,000$ .

- a. -2
- b. 0
- c. 3
- d. -7
- e. 5

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: False

DATE CREATED: 1/21/2016 10:03 AM

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69. Find  $dy/dx$  for the following equation:

$$8x + y^2 - 5y + 7 = 0$$

- a.  $\frac{dy}{dx} = \frac{5}{8-2y}$
- b.  $\frac{dy}{dx} = \frac{8}{5-2y}$
- c.  $\frac{dy}{dx} = \frac{4}{5-y}$
- d.  $\frac{dy}{dx} = \frac{5}{5-y}$
- e.  $\frac{dy}{dx} = \frac{4}{8-y}$

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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70. Find  $\frac{dy}{dx}$  for the equation  $-\sqrt{xy} = x - 20y$  by implicit differentiation and evaluate the derivative at the point  $(32, 2)$ .

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a.  $\frac{1}{-16}$

b.  $\frac{1}{16}$

c.  $\frac{9}{16}$

d.  $\frac{9}{-16}$

e. 0

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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71. Assume that  $x$  and  $y$  are differentiable functions of  $t$ . Find  $\frac{dy}{dt}$  using the given values.

$$y = 6x^3 + 9x^2 - x \text{ for } x = 2, \frac{dx}{dt} = 2.$$

a. 216

b. 82

c. 164

d. 214

e. 107

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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72. Assume that  $x$  and  $y$  are differentiable functions of  $t$ . Given  $xy = -8$ , find  $\frac{dy}{dt}$  when  $x = 10$  and  $\frac{dx}{dt} = -4$ .

a.  $\frac{dy}{dt} = -\frac{208}{25}$

b.  $\frac{dy}{dt} = \frac{8}{25}$

c.  $\frac{dy}{dt} = -\frac{8}{25}$



## Chapter 2 - Differentiation

d.  $\frac{dy}{dt} = -\frac{25}{8}$

e.  $\frac{dy}{dt} = \frac{208}{25}$

ANSWER: c

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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73. Assume that  $x$  and  $y$  are differentiable functions of  $t$ . Find  $\frac{dx}{dt}$  given that  $x = -3$ ,  $y = -2$ , and  $\frac{dy}{dt} = 4$ .

$$y^2 - x^2 = -5$$

a. -1.33

b. 1.5

c. 6

d. -8

e. 2.67

ANSWER: e

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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74. **Area.** The radius,  $r$ , of a circle is decreasing at a rate of 4 centimeters per minute.

Find the rate of change of area,  $A$ , when the radius is 6.

a.  $\frac{dA}{dt} = -24\pi$

b.  $\frac{dA}{dt} = -288\pi$

c.  $\frac{dA}{dt} = 288\pi$

d.  $\frac{dA}{dt} = -48\pi$

e.  $\frac{dA}{dt} = 48\pi$

ANSWER: d

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POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
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75. **Volume and radius.** Suppose that air is being pumped into a spherical balloon at a rate of  $8 \text{ in.}^3/\text{min}$ . At what rate is the radius of the balloon increasing when the radius is 7 in.?

a.  $\frac{dr}{dt} = \frac{8}{49\pi}$

b.  $\frac{dr}{dt} = \frac{2}{7\pi}$

c.  $\frac{dr}{dt} = \frac{49}{8\pi}$

d.  $\frac{dr}{dt} = \frac{7}{8\pi}$

e.  $\frac{dr}{dt} = \frac{2}{49\pi}$

ANSWER: e  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
DATE CREATED: 1/21/2016 10:03 AM  
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76. The radius  $r$  of a sphere is increasing at a rate of 5 inches per minute. Find the rate of change of volume when  $r = 12$  inches. Round your answer to one decimal place.

- a. 1,809.6 cubic inches per minute
- b. 7,238.2 cubic inches per minute
- c. 36,191.1 cubic inches per minute
- d. 9,047.8 cubic inches per minute
- e. 27,143.4 cubic inches per minute

ANSWER: d  
POINTS: 1  
QUESTION TYPE: Multiple Choice  
HAS VARIABLES: True  
DATE CREATED: 1/21/2016 10:03 AM  
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77. **Profit.** Suppose that the monthly revenue and cost (in dollars) for  $x$  units of a product are  $R = 200x - \frac{x^2}{50}$

## Chapter 2 - Differentiation

and  $C = 8,000 + 80x$ . At what rate per month is the profit changing if the number of units produced and sold is 100 and is increasing at a rate of 10 units per month?

- a. 11,960 per month
- b. 1,160 per month
- c. 1,960 per month
- d. 760 per month
- e. 19,960 per month

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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78. The lengths of the edges of a cube are increasing at a rate of 4 ft/min. At what rate is the surface area changing when the edges are 21 ft long?

- a. 96 ft<sup>2</sup>/min
- b. 1,008 ft<sup>2</sup>/min
- c. 504 ft<sup>2</sup>/min
- d. 2,016 ft<sup>2</sup>/min
- e. 84 ft<sup>2</sup>/min

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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79. A point is moving along the graph of the function  $y = 8x^2 + 4$  such that  $\frac{dx}{dt} = 5$  centimeters per second.

Find  $\frac{dy}{dt}$  for the given values of  $x$ .

(1)  $x = 4$

(2)  $x = 6$

a.

(1)  $\frac{dy}{dt} = 4$

(2)  $\frac{dy}{dt} = 6$

## Chapter 2 - Differentiation

b.

$$(1) \frac{dy}{dt} = 320$$

$$(2) \frac{dy}{dt} = 480$$

c.

$$(1) \frac{dy}{dt} = 480$$

$$(2) \frac{dy}{dt} = 320$$

d.

$$(1) \frac{dy}{dt} = 6$$

$$(2) \frac{dy}{dt} = -320$$

e.

$$(1) \frac{dy}{dt} = 6$$

$$(2) \frac{dy}{dt} = 480$$

ANSWER: b

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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80. A point is moving along the graph of the function  $y = \frac{1}{3x^2 + 5}$  such that  $\frac{dx}{dt} = 3$  centimeters per second.

Find  $\frac{dy}{dt}$  when  $x = 2$ .

a.  $\frac{dy}{dt} = -\frac{12}{289}$

b.  $\frac{dy}{dt} = \frac{36}{289}$

c.  $\frac{dy}{dt} = -\frac{36}{289}$

d.  $\frac{dy}{dt} = \frac{12}{289}$

## Chapter 2 - Differentiation

e.  $\frac{dy}{dt} = -\frac{36}{17}$

ANSWER: c

POINTS: 1

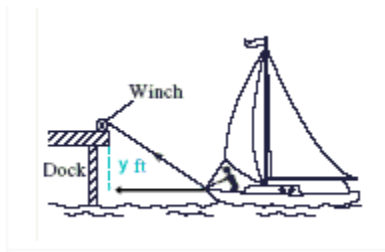
QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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81. **Boat docking.** Suppose that a boat is being pulled toward a dock by a winch that is 24 ft above the level of the boat deck. If the winch is pulling the cable at a rate of  $13 \frac{\text{ft}}{\text{min}}$ , at what rate is the boat approaching the dock when it is 32 ft from the dock? Use the figure below.



a.  $16.25 \frac{\text{ft}}{\text{min}}$

b.  $13 \frac{\text{ft}}{\text{min}}$

c.  $21.67 \frac{\text{ft}}{\text{min}}$

d.  $9.75 \frac{\text{ft}}{\text{min}}$

e.  $7.8 \frac{\text{ft}}{\text{min}}$

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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82. An airplane flying at an altitude of 4 miles passes directly over a radar antenna. When the airplane is 25 miles away ( $s = 25$ ), the radar detects that the distance  $s$  is changing at a rate of 220 miles per hour. What is the speed of the airplane? Round your answer to the nearest integer.

a. 223 mi/hr

**Chapter 2 - Differentiation**

- b. 206 mi/hr
- c. 446 mi/hr
- d. 111 mi/hr
- e. 103 mi/hr

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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83. A baseball diamond has the shape of a square with sides 90 feet long. A player running from second base to third base at a speed of 27 feet per second is 60 feet from third base. At what rate is the player's distance  $s$  from home plate changing? Round your answer to one decimal place.

- a. -24.1 feet/second
- b. -0.2 feet/second
- c. -0.6 feet/second
- d. -15 feet/second
- e. -0.9 feet/second

ANSWER: d

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

DATE CREATED: 1/21/2016 10:03 AM

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84. A retail sporting goods store estimates that weekly sales and weekly advertising costs are related by the equation  $S = 2,280 + 80x + 0.36x^2$ . The current weekly advertising costs are \$1,500, and these costs are increasing at a rate of \$135 per week. Find the current rate of change of weekly sales.

- a. 156,600 dollars per week
- b. 158,880 dollars per week
- c. 85,980 dollars per week
- d. 83,700 dollars per week
- e. 823,080 dollars per week

ANSWER: a

POINTS: 1

QUESTION TYPE: Multiple Choice

HAS VARIABLES: True

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