Name: ________________________ Class: ___________________ Date: __________ ID: A

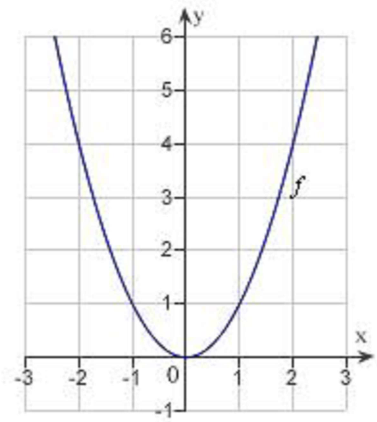
Ch 2 MC ~~Prictice~~- Practice Makes Perfect!

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Find an equation of the tangent line to the graph of the function $f(x) = x^2 + 5x + 2$ at the point $(-5, 2)$.

a. $y = -23$
b. $y = -5x - 23$
c. $y = 15x$
d. $y = 5x$
e. $y = -15x - 73$

____ 2. The graph of the function f is given below. Select the graph of $f\,'$.



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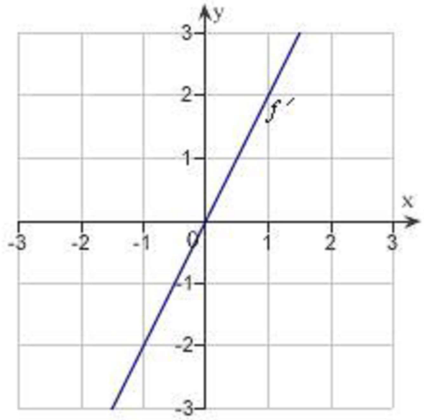
a.



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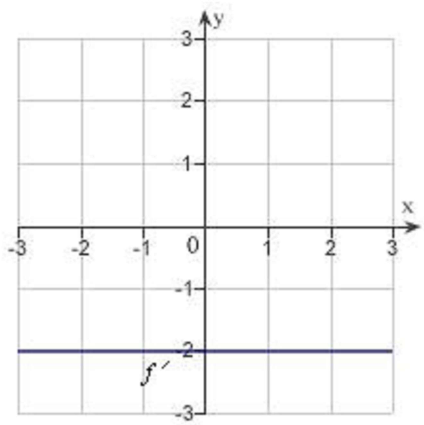

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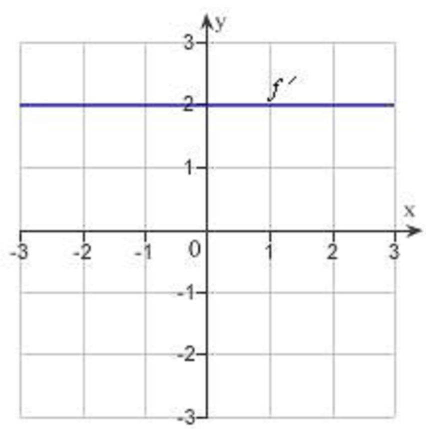

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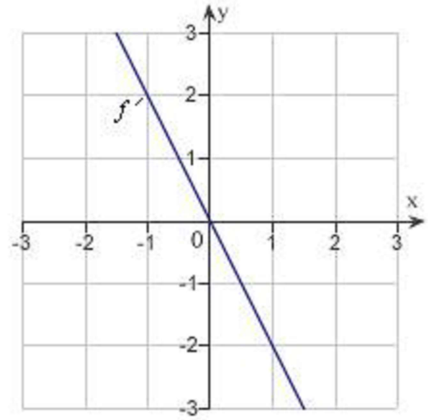

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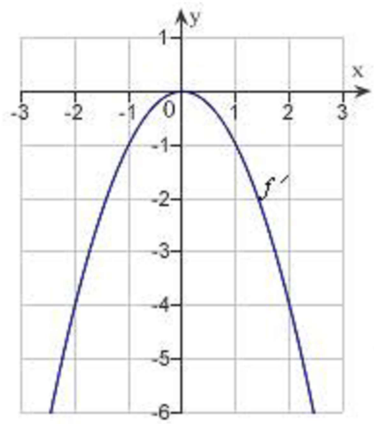
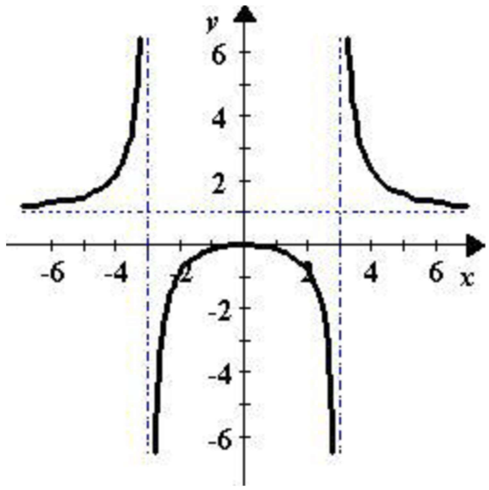


____ 3. Describe the x-values at which the graph of the function $f(x) = \dfrac{x^2}{x^2 - 9}$ given below is differentiable.



a. $f(x)$ is differentiable at $x = \pm 3$.
b. $f(x)$ is differentiable everywhere except at $x = \pm 3$.
c. $f(x)$ is differentiable everywhere except at $x = 0$.
d. $f(x)$ is differentiable on the interval $\left(-2, 2\right)$.
e. $f(x)$ is differentiable on the interval $\left(2, \infty\right)$.

____ 4. Find the derivative of the function.

$$f(x) = \frac{1}{x^8}$$

a. $f'(x) = -\dfrac{9}{x^9}$

b. $f'(x) = -\dfrac{8}{x^7}$

c. $f'(x) = \dfrac{8}{x^9}$

d. $f'(x) = -\dfrac{8}{x^9}$

e. $f'(x) = -\dfrac{7}{x^9}$

____ 5. Find the derivative of the function $f(x) = -5x^3 - 2\sin(x)$.

a. $f\,'(x) = -15x^2 + 2\cos(x)$
b. $f\,'(x) = -10x^2 - 2\cos(x)$
c. $f\,'(x) = -5x^2 - 2\cos(x)$
d. $f\,'(x) = -5x^2 + 2\cos(x)$
e. $f\,'(x) = -15x^2 - 2\cos(x)$

____ 6. Find the slope of the graph of the function at the given value.

$f(x) = \dfrac{-5}{x^3}$ when $x = 9$

a. $f\,'(9) = -\dfrac{5}{2187}$
b. $f\,'(9) = -\dfrac{5}{729}$
c. $f\,'(9) = \dfrac{5}{27}$
d. $f\,'(9) = -\dfrac{5}{27}$
e. $f\,'(9) = \dfrac{5}{2187}$

____ 7. Find the derivative of the function $f(x) = \dfrac{x^5 - 9}{x^4}$.

a. $f\,'(x) = 1 + \dfrac{36}{x^5}$
b. $f\,'(x) = 1 - \dfrac{36}{x^5}$
c. $f\,'(x) = 1 + \dfrac{4}{x^5}$
d. $f\,'(x) = 1 - \dfrac{9}{x^5}$
e. $f\,'(x) = 1 + \dfrac{9}{x^5}$

____ 8. Determine all values of x, (if any), at which the graph of the function has a horizontal tangent.

$y(x) = x^3 + 12x^2 + 8$

a. $x = 0$
b. $x = -8$
c. $x = 0$ and $x = -8$
d. $x = 0$ and $x = 8$
e. The graph has no horizontal tangents.

____ 9. Determine all values of x, (if any), at which the graph of the function has a horizontal tangent.

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

a. $x = 1$
b. $x = 0$ and $x = -1$
c. $x = 0$ and $x = 1$
d. $x = 0$
e. The graph has no horizontal tangents.

____ 10. Suppose the position function for a free-falling object on a certain planet is given by $s(t) = -13t^3 + v_0 t + s_0$. A silver coin is dropped from the top of a building that is 1370 feet tall. Determine the velocity function for the coin.

a. $v(t) = -13t^3 + 1370$
b. $v(t) = -39t^2$
c. $v(t) = -39t^3 + 1370$
d. $v(t) = -13t^2$
e. $v(t) = -3t^4$

____ 11. Suppose the position function for a free-falling object on a certain planet is given by $s(t) = -16t^2 + v_0 t + s_0$. A silver coin is dropped from the top of a building that is 1372 feet tall. Determine the average velocity of the coin over the time interval $[3, 4]$.

a. –113 ft/sec
b. 80 ft/sec
c. 112 ft/sec
d. –112 ft/sec
e. –80 ft/sec

____ 12. Suppose the position function for a free-falling object on a certain planet is given by $s(t) = -14t^2 + v_0 t + s_0$. A silver coin is dropped from the top of a building that is 1370 feet tall. Find velocity of the coin at impact. Round your answer to the three decimal places.

a. –286.705 ft/sec
b. –138.492 ft/sec
c. –111.041 ft/sec
d. –276.984 ft/sec
e. –261.984 ft/sec

____ 13. A ball is thrown straight down from the top of a 300-ft building with an initial velocity of -12 ft per second. The position function is $s(t) = -16t^2 + v_0 t + s_0$. What is the velocity of the ball after 4 seconds?

a. The velocity after 4 seconds is –76 ft per second.
b. The velocity after 4 seconds is –116 ft per second.
c. The velocity after 4 seconds is –140 ft per second.
d. The velocity after 4 seconds is –52 ft per second.
e. The velocity after 4 seconds is –280 ft per second.

____ 14. A projectile is shot upwards from the surface of the earth with an initial velocity of 108 meters per second. The position function is $s(t) = -4.9t^2 + v_0 t + s_0$.

What is its velocity after 7 seconds?

a. The velocity after 7 seconds is 181.7 meters per second.
b. The velocity after 7 seconds is –142.3 meters per second.
c. The velocity after 7 seconds is 39.4 meters per second.
d. The velocity after 7 seconds is 73.7 meters per second.
e. The velocity after 7 seconds is –176.6 meters per second.

____ 15. The volume of a cube with sides of length s is given by $V = s^3$. Find the rate of change of volume with respect to s when $s = 6$ centimeters.

a. 648 cm^2
b. 216 cm^2
c. 36 cm^2
d. 108 cm^2
e. 72 cm^2

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____ 16. Find the derivative of the algebraic function $H(v) = \left(v^5 - 3\right)\left(v^3 + 3\right)$.

a. $H'(s) = 8v^7 + 15v^4 + 9v^2$
b. $H'(s) = 8v^7 + 9v^4 + 15v^2$
c. $H'(s) = 8v^7 - 15v^4 - 9v^2$
d. $H'(s) = 8v^7 + 15v^4 - 9v^2$
e. $H'(s) = 8v^7 + 9v^4 - 3v^2$

____ 17. Use the Product Rule to differentiate $f(s) = s^5 \cos s$.

a. $f'(s) = -5s^4 \sin s$
b. $f'(s) = -s^5 \cos s + 5s^4 \sin s$
c. $f'(s) = -s^5 \sin s - 5s^4 \cos s$
d. $f'(s) = -s^5 \sin s + 5s^4 \cos s$
e. $f'(s) = s^5 \sin s + 5s^4 \cos s$

____ 18. Use the Quotient Rule to differentiate the function $f(x) = \dfrac{8x}{x^5 + 3}$.

a. $f'(x) = -\dfrac{8\left(-3 + 4x^5\right)}{\left(x^5 + 3\right)^2}$

b. $f'(x) = \dfrac{8\left(-3 - 4x^5\right)}{\left(x^5 + 3\right)^2}$

c. $f'(x) = -\dfrac{8\left(3 + 5x^5\right)}{\left(x^5 + 3\right)^2}$

d. $f'(x) = \dfrac{8\left(3 + 4x^5\right)}{\left(x^5 + 3\right)^2}$

e. $f'(x) = -\dfrac{8\left(3 + 6x^5\right)}{\left(x^5 + 3\right)^2}$

____ 19. Use the Quotient Rule to differentiate the function $f'(x) = \dfrac{4+x}{x^2+9}$.

a. $f'(x) = \dfrac{\left(9+8x-x^2\right)}{\left(x^2+9\right)^2}$

b. $f'(x) = \dfrac{\left(9-8x-x^2\right)}{\left(x^2+9\right)^2}$

c. $f'(x) = \dfrac{\left(9-4x-x^2\right)}{\left(x^2+9\right)^2}$

d. $f'(x) = -\dfrac{\left(9-8x-x^2\right)}{\left(x^2+9\right)^2}$

e. $f'(x) = \dfrac{\left(9-8x+x^2\right)}{\left(x^2+9\right)^2}$

____ 20. Find the derivative of the function $f(t) = 15t^3 + 6\sec(t)$.

a. $f'(t) = 45t^2 + 6\sec(t)\tan(t)$
b. $f'(t) = 3t^2 + 6\sec^2(t)$
c. $f'(t) = 45t^2 + 6\tan(t)$
d. $f'(t) = 3t^2 + 6\sec(t)\tan(t)$
e. $f'(t) = 45t^2 - 6\sec(t)\tan(t)$

____ 21. The radius of a right circular cylinder is $\sqrt{3t+6}$ and its height is t^5, where t is time in seconds and the dimensions are in inches. Find the rate of change of the volume of the cylinder, V, with respect to time.

a. $\dfrac{dV}{dt} = \pi t^4(30+15t)$ cubic inches per second
b. $\dfrac{dV}{dt} = \pi t^4(30+18t)$ cubic inches per second
c. $\dfrac{dV}{dt} = \pi t^3(30+18t)$ cubic inches per second
d. $\dfrac{dV}{dt} = \pi t^4(6+18t)$ cubic inches per second
e. $\dfrac{dV}{dt} = \pi t^5(30+18t)$ cubic inches per second

____ 22. A population of 620 bacteria is introduced into a culture and grows in number according to the equation $P(t) = 620\left(1+\dfrac{4t}{34+t^2}\right)$ where t is measured in hours. Find the rate at which the population is growing when $t = 2$. Round your answer to two decimal places.

a. 226.7 bacteria per hour
b. 68.89 bacteria per hour
c. 65.26 bacteria per hour
d. 51.52 bacteria per hour
e. 61.23 bacteria per hour

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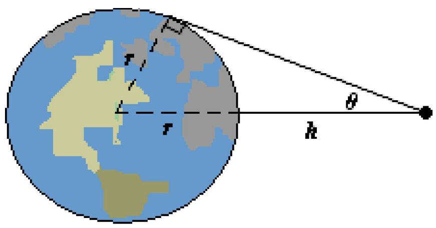
____ 23. When satellites observe Earth, they can scan only part of Earth's surface. Some satellites have sensors that can measure the angle θ shown in the figure. Let h represent the satellite's distance from Earth's surface and let r represent Earth's radius. Find the rate at which h is changing with respect to θ when $\theta = 60°$ (Assume $r = 4460$ miles.) Round your answer to the nearest unit.



a. –2973 mi/radian
b. –5150 mi/radian
c. 5150 mi/radian
d. –8920 mi/radian
e. 2973 mi/radian

____ 24. Suppose that an automobile's velocity starting from rest is $v(t) = \dfrac{240t}{5t+13}$ where v is measured in feet per second. Find the acceleration at 9 seconds. Round your answer to one decimal place.

a. 1.9 ft/sec^2
b. 0.9 ft/sec^2
c. 0.6 ft/sec^2
d. 0.2 ft/sec^2
e. 8.3 ft/sec^2

____ 25. Find the derivative of the function.

$f(x) = x^7(5+8x)^3$

a. $f'(x) = x^2(5+8x)^6(35+80x)$
b. $f'(x) = x^6(5+8x)^2(35+80x)$
c. $f'(x) = 8x^7(5+8x)^2(35+80x)$
d. $f'(x) = x^6(5+8x)^3(35+80x)$
e. $f'(x) = x^6(5+8x)^2(35+8x)$

____ 26. Find the derivative of the function $y = 8\sin 5x$.

a. $y' = 40\sin 5x$
b. $y' = 40\cos 5x$
c. $y' = -8\sin 5x$
d. $y' = -40\cos 5x$
e. $y' = 8\cos 5x$

____ 27. Find the derivative of the function.

$$y = \cos\left(2x^4 - 6\right)$$

a. $y' = 8x^4\cos\left(2x^4 - 6\right)$
b. $y' = 8\sin\left(2x^4 - 6\right)$
c. $y' = -8x^3\sin\left(2x^4 - 6\right)$
d. $y' = -8\sin\left(2x^4 - 6\right)$
e. $y' = -2\sin\left(2x^4 - 6\right)$

____ 28. Find the derivative of the function.

$$y = \frac{3}{5}\sec^2 x$$

a. $y' = -\frac{6}{5}\sec^2 x\ \tan x$
b. $y' = \frac{6}{5}\sec^2 x\ \tan^2 x$
c. $y' = \frac{6}{5}\sec x\ \tan x$
d. $y' = \frac{6}{5}\sec^2 x\ \tan x$
e. $y' = \frac{3}{5}\sec^2 x\ \tan x$

____ 29. Find the derivative of the function.

$f(t) = 5\sec^2(7\pi t - 5)$

a. $f'(t) = 35\pi\sec^2(7\pi t - 5)\tan(7\pi t - 5)$
b. $f'(t) = 70\sec^2(7\pi t - 5)\tan(7\pi t - 5)$
c. $f'(t) = 70\pi\sec^2(7\pi t - 5)\tan(7\pi t - 5)$
d. $f'(t) = 70\pi\sec^2(7\pi t - 5)\tan(5 - 7\pi t)$
e. $f'(t) = 7\pi\sec^2(7\pi t - 5)\tan(7\pi t - 5)$

____ 30. Find the second derivative of the function.

$f(x) = \left(3x^3 + 7\right)^7$

a. $f'' = 63x\,(7 + 3x)^5\left(14 + 63x^3\right)$
b. $f'' = 63x\left(7 + 3x^3\right)^5\left(14 + 60x^3\right)$
c. $f'' = 63x\left(7 + 3x^2\right)^5\left(14 + 60x^3\right)$
d. $f'' = 63x\left(7 + 3x^3\right)^5\left(14 + 63x^3\right)$
e. $f'' = 63x\left(7 + 3x^3\right)^5\left(14 - 60x^3\right)$

____ 31. Find the second derivative of the function $f(x) = \sin 5x^6$.

a. $f''(x) = 30x^4\cos 5x^6 + 30x^{10}\sin 5x^6$
b. $f''(x) = 30x^4\cos 5x^6 - 900x^{10}\sin 5x^6$
c. $f''(x) = 180x^4\cos 5x^6 - 900x^{10}\sin 5x^6$
d. $f''(x) = 150x^4\cos 5x^6 + 900x^{10}\sin 5x^6$
e. $f''(x) = 150x^4\cos 5x^6 - 900x^{10}\sin 5x^6$

____ 32. Suppose a 15-centimeter pendulum moves according to the equation $\theta = 0.6\cos 8t$ where θ is the angular displacement from the vertical in radians and t is the time in seconds. Determine the rate of change of θ when $t = 7$ seconds. Round your answer to four decimal places.

a. 2.5034 radians per second
b. 3.6185 radians per second
c. 0.3129 radians per second
d. 3.1535 radians per second
e. 4.1724 radians per second

____ 33. Find $\frac{dy}{dx}$ by implicit differentiation.

$x^{\frac{6}{7}} + y^{\frac{8}{5}} = 9$

a. $\frac{dy}{dx} = -\frac{28x^{\frac{-1}{7}}}{15y^{\frac{3}{5}}}$

b. $\frac{dy}{dx} = -\frac{15x^{\frac{-1}{7}}}{7y^{\frac{3}{5}}}$

c. $\frac{dy}{dx} = -\frac{3x^{\frac{-1}{7}}}{28y^{\frac{3}{5}}}$

d. $\frac{dy}{dx} = \frac{15x^{\frac{-1}{7}}}{28y^{\frac{3}{5}}}$

e. $\frac{dy}{dx} = -\frac{15x^{\frac{-1}{7}}}{28y^{\frac{3}{5}}}$

____ 34. Find $\frac{dy}{dx}$ by implicit differentiation given that $2xy = 9$.

a. $\frac{dy}{dx} = -\frac{9y}{x}$

b. $\frac{dy}{dx} = -9xy$

c. $\frac{dy}{dx} = -xy$

d. $\frac{dy}{dx} = 9xy$

e. $\frac{dy}{dx} = -\frac{y}{x}$

____ 35. Find $\dfrac{dy}{dx}$ by implicit differentiation.

$x^4 + 7x + 6xy - y^7 = 9$

a. $\dfrac{dy}{dx} = -\dfrac{4x^3 + 7 + 6y}{7y^6 - 6x}$

b. $\dfrac{dy}{dx} = \dfrac{4x^3 + 7 - 6y}{7y^6 - 6x}$

c. $\dfrac{dy}{dx} = \dfrac{4x^3 + 7 + 6y}{6y^6 - 6x}$

d. $\dfrac{dy}{dx} = \dfrac{4x^3 + 7 + 6y}{7y^6 - 6x}$

e. $\dfrac{dy}{dx} = \dfrac{3x^3 + 7 + 6y}{7y^6 - 6x}$

____ 36. Find $\dfrac{dy}{dx}$ by implicit differentiation.

$\sin x + 7\cos 14y = 2$

a. $\dfrac{dy}{dx} = \dfrac{\cos x}{98\cos 14y}$

b. $\dfrac{dy}{dx} = \dfrac{\cos x}{98\sin 14y}$

c. $\dfrac{dy}{dx} = \dfrac{\cos x}{14\sin 14y}$

d. $\dfrac{dy}{dx} = \dfrac{\cos x}{98\sin y}$

e. $\dfrac{dy}{dx} = -\dfrac{\cos x}{98\sin 14y}$

____ 37. Evaluate $\frac{dy}{dx}$ for the equation $7xy = 21$ at the given point $(-3, -1)$. Round your answer to two decimal places.

a. $\frac{dy}{dx} = 7.00$
b. $\frac{dy}{dx} = 63.00$
c. $\frac{dy}{dx} = -0.33$
d. $\frac{dy}{dx} = -63.00$
e. $\frac{dy}{dx} = -3.00$

____ 38. Find $\frac{dy}{dx}$ by implicit differentiation given that $\tan(4x + y) = 4x$. Use the original equation to simplify your answer.

a. $\frac{dy}{dx} = \frac{4x}{x^2 + 1}$
b. $\frac{dy}{dx} = -\frac{4x^2}{x^2 - 1}$
c. $\frac{dy}{dx} = \frac{4x^2}{x^2 + 1}$
d. $\frac{dy}{dx} = -\frac{4x^2}{x^2 + 1}$
e. $\frac{dy}{dx} = \frac{4x^2}{x^2 - 1}$

____ 39. Find the slope of the tangent line $(16 - x)y^2 = x^3$ at the given point $(8, 8)$. Round your answer to two decimal places.

a. 0.67
b. 2.00
c. 1.00
d. 1.67
e. 3.00

____ 40. Find an equation of the tangent line to the graph of the function $(y-6)^2 = 5(x-5)$ at the point $(8.20, 2.00)$.The coefficients below are given to two decimal places.

a. $y = -0.63x + 7.13$
b. $y = 3.38x + 25.68$
c. $y = 3.38x - 25.68$
d. $y = -0.63x + 25.68$
e. $y = 0.63x + 7.13$

____ 41. Use implicit differentiation to find an equation of the tangent line to the ellipse $\frac{x^2}{2} + \frac{y^2}{98} = 1$ at $(1, 7)$.

a. $y = -11x + 11$
b. $y = -2x + 9$
c. $y = -8x + 9$
d. $y = -9x + 11$
e. $y = -4x + 9$

____ 42. Find $\frac{d^2y}{d^2x}$ in terms of x and y given that $x^2 + 6y^2 = 9$. Use the original equation to simplify your answer.

a. $y'' = -\frac{1}{4y^3}$
b. $y'' = -1y^3$
c. $y'' = -4y^3$
d. $y'' = -24y^3$
e. $y'' = -\frac{1}{24y^3}$

____ 43. Find $\dfrac{d^2y}{dx^2}$ in terms of *x* and *y*.

$x^2 + y^2 = 6$

a. $\dfrac{d^2y}{dx^2} = \left(-\dfrac{x}{y}\right)^2$

b. $\dfrac{d^2y}{dx^2} = -\dfrac{6}{y^2}$

c. $\dfrac{d^2y}{dx^2} = \dfrac{\dfrac{x^2}{y} + y}{y^2}$

d. $\dfrac{d^2y}{dx^2} = \left(-\dfrac{y}{x}\right)^2$

e. $\dfrac{d^2y}{dx^2} = -\dfrac{\dfrac{x^2}{y} + y}{y^2}$

____ 44. Find $\dfrac{d^2y}{dx^2}$ in terms of *x* and *y*.

$5 - 2xy = 7x - 3y$

a. $\dfrac{d^2y}{dx^2} = \dfrac{4\left(2y - 7\right)}{(3 - 2x)^2}$

b. $\dfrac{d^2y}{dx^2} = \dfrac{4\left(2 + 7y\right)}{(3 + 2x)^2}$

c. $\dfrac{d^2y}{dx^2} = \dfrac{-124}{(3 + 2x)^3}$

d. $\dfrac{d^2y}{dx^2} = \dfrac{44}{(3 - 2x)^3}$

e. $\dfrac{d^2y}{dx^2} = \dfrac{4\left(2y + 7\right)}{(3 + 2x)^2}$

____ 45. Find the points at which the graph of the equation has a vertical or horizontal tangent line.

$5x^2 + 4y^2 - 10x + 24y + 8 = 0$

a. There is a vertical tangent at $y = -3$ but no horizontal tangents.
b. There is a horizontal tangent at $x = 1$ and a vertical tangent at $y = -3$.
c. There is a horizontal tangent at $x = 1$ but no vertical tangents.
d. There is a horizontal tangent at $x = -2$ and a vertical tangent at $y = -2$.
e. There are no horizontal or vertical tangent lines.

____ 46. Assume that x and y are both differentiable functions of t. Find $\frac{dy}{dt}$ when $x = 49$ and $\frac{dx}{dt} = 17$ for the equation $y = \sqrt{x}$.

a. $\frac{dy}{dt} = \frac{17}{14}$
b. $\frac{dy}{dt} = 14$
c. $\frac{dy}{dt} = \frac{14}{17}$
d. $\frac{dy}{dt} = -\frac{17}{14}$
e. $\frac{dy}{dt} = -14$

____ 47. A point is moving along the graph of the function $y = \frac{1}{9x^2 + 4}$ such that $\frac{dx}{dt} = 2$ centimeters per second. Find $\frac{dy}{dt}$ when $x = 2$.

a. $\frac{dy}{dt} = -\frac{9}{5}$
b. $\frac{dy}{dt} = \frac{9}{200}$
c. $\frac{dy}{dt} = \frac{9}{400}$
d. $\frac{dy}{dt} = -\frac{9}{400}$
e. $\frac{dy}{dt} = -\frac{9}{200}$

____ 48. The radius, *r,* of a circle is decreasing at a rate of 5 centimeters per minute.

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

a. $\dfrac{dA}{dt} = -360\pi$ sq cm/min

b. $\dfrac{dA}{dt} = 360\pi$ sq cm/min

c. $\dfrac{dA}{dt} = -60\pi$ sq cm/min

d. $\dfrac{dA}{dt} = 60\pi$ sq cm/min

e. $\dfrac{dA}{dt} = -30\pi$ sq cm/min

____ 49. A spherical balloon is inflated with gas at the rate of 300 cubic centimeters per minute. How fast is the radius of the balloon increasing at the instant the radius is 70 centimeters?

a. $\dfrac{dr}{dt} = \dfrac{3}{98\pi}$ cm/min

b. $\dfrac{dr}{dt} = \dfrac{1}{98\pi}$ cm/min

c. $\dfrac{dr}{dt} = \dfrac{3}{196\pi}$ cm/min

d. $\dfrac{dr}{dt} = 98\pi$ cm/min

e. $\dfrac{dr}{dt} = 196\pi$ cm/min

____ 50. All edges of a cube are expanding at a rate of 9 centimeters per second. How fast is the volume changing when each edge is 2 centimeters?

a. 486 cm^3 / sec

b. 72 cm^3 / sec

c. 36 cm^3 / sec

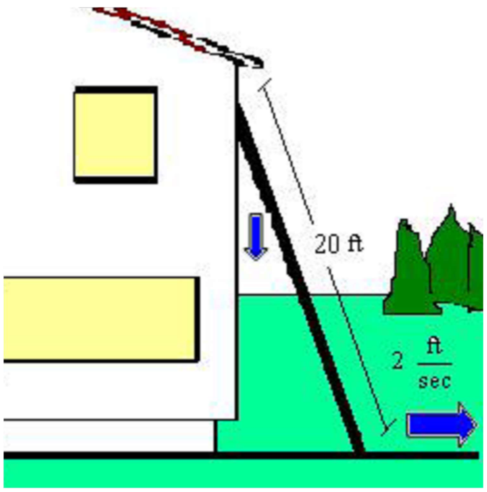
d. 108 cm^3 / sec

e. 162 cm^3 / sec

____ 51. A conical tank (with vertex down) is 12 feet across the top and 18 feet deep. If water is flowing into the tank at a rate of 18 cubic feet per minute, find the rate of change of the depth of the water when the water is 10 feet deep.

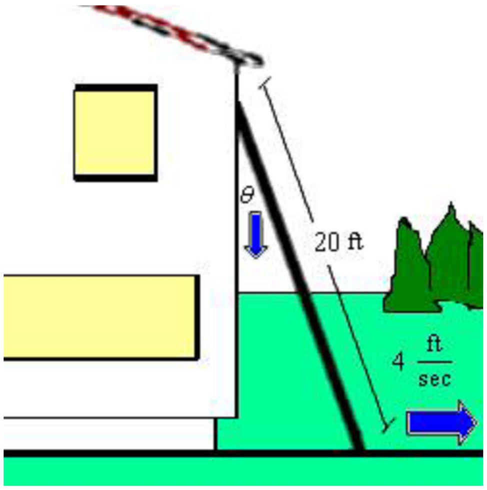
a. $\dfrac{9}{40\pi}$ ft/min
b. $\dfrac{9}{100\pi}$ ft/min
c. $\dfrac{81}{20\pi}$ ft/min
d. $\dfrac{81}{50\pi}$ ft/min
e. $\dfrac{81}{200\pi}$ ft/min

____ 52. A ladder 20 feet long is leaning against the wall of a house (see figure). The base of the ladder is pulled away from the wall at a rate of 2 feet per second. How fast is the top of the ladder moving down the wall when its base is 13 feet from the wall? Round your answer to two decimal places.



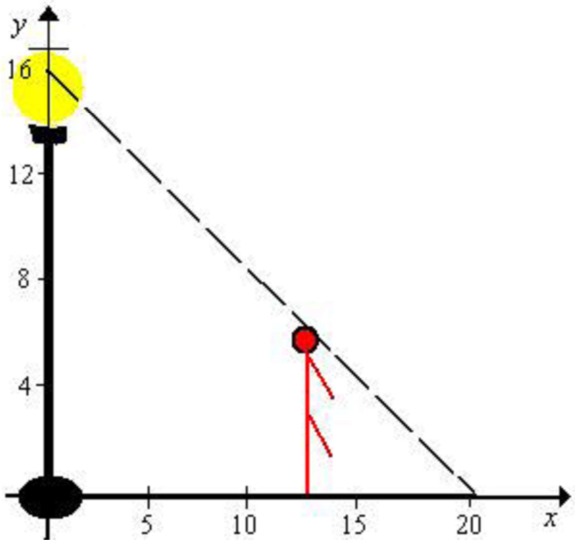
a. 5.00 ft/sec
b. −5.33 ft/sec
c. −1.71 ft/sec
d. 5.33 ft/sec
e. −6.00 ft/sec

____ 53. A ladder 20 feet long is leaning against the wall of a house (see figure). The base of the ladder is pulled away from the wall at a rate of 2 feet per second. Find the rate at which the angle between the ladder and the wall of the house is changing when the base of the ladder is 19 feet from the wall. Round your answer to three decimal places.



a. 0.242 rad/sec
b. 0.190 rad/sec
c. 2.168 rad/sec
d. 3.804 rad/sec
e. 0.278 rad/sec

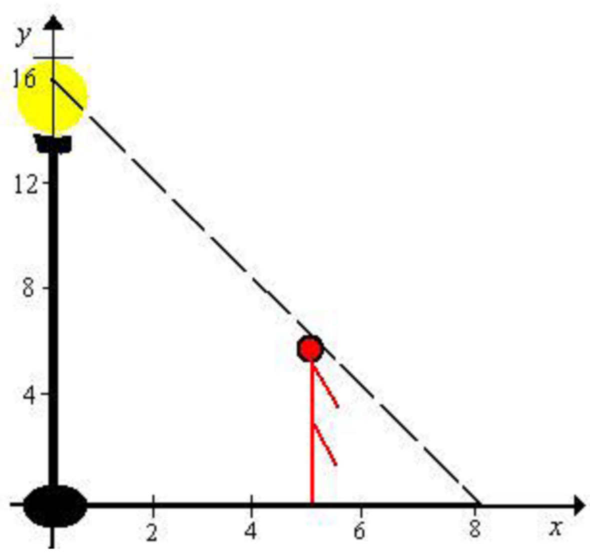
____ 54. A man 6 feet tall walks at a rate of 10 feet per second away from a light that is 15 feet above the ground (see figure). When he is 13 feet from the base of the light, at what rate is the tip of his shadow moving?



a. $\frac{1}{2}$ ft/sec
b. 50 ft/sec
c. $\frac{3}{50}$ ft/sec
d. $\frac{9}{2}$ ft/sec
e. $\frac{50}{3}$ ft/sec

Name: ________________________ **ID: A**

____ 55. A man 6 feet tall walks at a rate of 13 feet per second away from a light that is 15 feet above the ground (see figure). When he is 5 feet from the base of the light, at what rate is the length of his shadow changing?



a. $\frac{5}{2}$ ft/sec

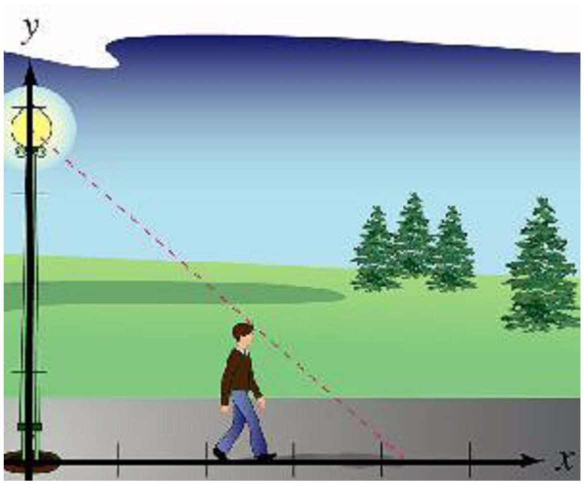
b. $\frac{65}{3}$ ft/sec

c. $\frac{26}{3}$ ft/sec

d. $\frac{3}{65}$ ft/sec

e. $\frac{1}{2}$ ft/sec

____ 56. A man 6 feet tall walks at a rate of 2 ft per second away from a light that is 16 ft above the ground (see figure). When he is 8 ft from the base of the light, find the rate.at which the tip of his shadow is moving.



a. $\frac{8}{5}$ ft per minute
b. $\frac{4}{5}$ ft per minute
c. $\frac{64}{5}$ ft per minute
d. $\frac{32}{5}$ ft per minute
e. $\frac{16}{5}$ ft per minute

____ 57. An airplane is flying in still air with an airspeed of 255 miles per hour. If it is climbing at an angle of 21°, find the rate at which it is gaining altitude. Round your answer to four decimal places.

a. 103.7178 mi/hr
b. 78.7993 mi/hr
c. 111.7846 mi/hr
d. 92.4589 mi/hr
e. 91.3838 mi/hr

Ch 2 MC Prictice
Answer Section

MULTIPLE CHOICE

1. ANS: B PTS: 1 DIF: Medium REF: Section 2.1
   OBJ: Write an equation of a line tangent to the graph of a function at a specified point
   MSC: Skill
2. ANS: A PTS: 1 DIF: Medium REF: Section 2.1
   OBJ: Identify the graph of f' using the given graph of f MSC: Skill
3. ANS: B PTS: 1 DIF: Medium REF: Section 2.1
   OBJ: Identify the x-value (or values) at which a function is differential
   MSC: Skill
4. ANS: D PTS: 1 DIF: Medium REF: Section 2.2
   OBJ: Differentiate a function using basic differentiation rules MSC: Skill
5. ANS: E PTS: 1 DIF: Medium REF: Section 2.2
   OBJ: Differentiate trigonometric functions MSC: Skill
6. ANS: E PTS: 1 DIF: Easy REF: Section 2.2
   OBJ: Calculate the slope of the graph of a function at a given point
   MSC: Skill
7. ANS: A PTS: 1 DIF: Medium REF: Section 2.2
   OBJ: Differentiate a function using basic differentiation rules MSC: Skill
8. ANS: C PTS: 1 DIF: Medium REF: Section 2.2
   OBJ: Calculate the values for which the slope of a function is zero
   MSC: Skill
9. ANS: A PTS: 1 DIF: Difficult REF: Section 2.2
   OBJ: Calculate the values for which the slope of a function is zero
   MSC: Skill
10. ANS: B PTS: 1 DIF: Medium REF: Section 2.2
    OBJ: Write the velocity function for a specified position function
    MSC: Application
11. ANS: D PTS: 1 DIF: Medium REF: Section 2.2
    OBJ: Calculate the average velocity from a given position function
    MSC: Application
12. ANS: D PTS: 1 DIF: Medium REF: Section 2.2
    OBJ: Calculate the velocity for an object falling according to a given position function
    MSC: Application
13. ANS: C PTS: 1 DIF: Difficult REF: Section 2.2
    OBJ: Derive the free-fall position function and evaluate velocity at different points
    MSC: Application
14. ANS: C PTS: 1 DIF: Difficult REF: Section 2.2
    OBJ: Derive the free-fall position function and evaluate velocity at different points
    MSC: Application
15. ANS: D PTS: 1 DIF: Medium REF: Section 2.2
    OBJ: Interpret a derivative as a rate of change MSC: Application
16. ANS: D PTS: 1 DIF: Medium REF: Section 2.3
    OBJ: Differentiate a function using the product rule MSC: Skill

17. ANS: D PTS: 1 DIF: Medium REF: Section 2.3
OBJ: Differentiate a function using the product rule MSC: Skill
18. ANS: A PTS: 1 DIF: Difficult REF: Section 2.3
OBJ: Differentiate a function using the quotient rule MSC: Skill
19. ANS: B PTS: 1 DIF: Difficult REF: Section 2.3
OBJ: Differentiate a function using the quotient rule MSC: Skill
20. ANS: A PTS: 1 DIF: Medium REF: Section 2.3
OBJ: Differentiate a function using the product rule MSC: Skill
21. ANS: B PTS: 1 DIF: Difficult REF: Section 2.3
OBJ: Interpret a derivative as a rate of change MSC: Application
22. ANS: D PTS: 1 DIF: Medium REF: Section 2.3
OBJ: Interpret a derivative as a rate of change MSC: Application
23. ANS: A PTS: 1 DIF: Difficult REF: Section 2.3
OBJ: Create a function in application and interpret its derivative as a rate of change
MSC: Application
24. ANS: B PTS: 1 DIF: Medium REF: Section 2.3
OBJ: Calculate the acceleration from a velocity function MSC: Application
25. ANS: B PTS: 1 DIF: Medium REF: Section 2.4
OBJ: Differentiate a function using the chain rule and product rule
MSC: Skill
26. ANS: B PTS: 1 DIF: Easy REF: Section 2.4
OBJ: Differentiate a function using the chain rule MSC: Skill
27. ANS: C PTS: 1 DIF: Medium REF: Section 2.4
OBJ: Differentiate a trigonometric function using the chain rule
MSC: Skill
28. ANS: D PTS: 1 DIF: Medium REF: Section 2.4
OBJ: Differentiate a trigonometric function using the chain rule
MSC: Skill
29. ANS: C PTS: 1 DIF: Medium REF: Section 2.4
OBJ: Differentiate a trigonometric function using the chain rule
MSC: Skill
30. ANS: B PTS: 1 DIF: Difficult REF: Section 2.4
OBJ: Calculate the second derivative of a function using the chain rule
MSC: Skill
31. ANS: E PTS: 1 DIF: Medium REF: Section 2.4
OBJ: Calculate the second derivative of a function using the chain rule
MSC: Skill
32. ANS: A PTS: 1 DIF: Difficult REF: Section 2.4
OBJ: Interpret a derivative as a rate of change MSC: Application
33. ANS: E PTS: 1 DIF: Easy REF: Section 2.5
OBJ: Differentiate an equation using implicit differentiation MSC: Skill
34. ANS: E PTS: 1 DIF: Easy REF: Section 2.5
OBJ: Differentiate an equation using implicit differentiation MSC: Skill
35. ANS: D PTS: 1 DIF: Medium REF: Section 2.5
OBJ: Differentiate an equation using implicit differentiation MSC: Skill
36. ANS: B PTS: 1 DIF: Medium REF: Section 2.5
OBJ: Differentiate an equation using implicit differentiation MSC: Skill

37. ANS: C PTS: 1 DIF: Easy REF: Section 2.5
OBJ: Evaluate the derivative of an implicit function at a given point
MSC: Skill
38. ANS: D PTS: 1 DIF: Medium REF: Section 2.5
OBJ: Differentiate an equation using implicit differentiation MSC: Skill
39. ANS: B PTS: 1 DIF: Difficult REF: Section 2.5
OBJ: Evaluate the derivative of an implicit function at a given point
MSC: Skill
40. ANS: A PTS: 1 DIF: Medium REF: Section 2.5
OBJ: Write an equation of a line tangent to the graph of an implicit function at a specified point
MSC: Skill
41. ANS: B PTS: 1 DIF: Easy REF: Section 2.5
OBJ: Write an equation of a line tangent to the graph of an ellipse at a specified point.
MSC: Skill
42. ANS: A PTS: 1 DIF: Medium REF: Section 2.5
OBJ: Calculate the second derivative implicitly MSC: Skill
43. ANS: E PTS: 1 DIF: Easy REF: Section 2.5
OBJ: Calculate the second derivative implicitly MSC: Skill
44. ANS: D PTS: 1 DIF: Easy REF: Section 2.5
OBJ: Calculate the second derivative implicitly MSC: Skill
45. ANS: B PTS: 1 DIF: Easy REF: Section 2.5
OBJ: Identify the points where an implicit function has horizontal and vertical tangent lines
MSC: Skill
46. ANS: A PTS: 1 DIF: Easy REF: Section 2.6
OBJ: Calculate the value of an implicit derivative from given information
MSC: Skill
47. ANS: E PTS: 1 DIF: Easy REF: Section 2.6
OBJ: Solve a related rate problem involving a point moving along a curve
MSC: Skill
48. ANS: C PTS: 1 DIF: Easy REF: Section 2.6
OBJ: Solve a related rate problem involving the area of a circle and its radius
MSC: Application
49. ANS: C PTS: 1 DIF: Easy REF: Section 2.6
OBJ: Solve a related rate problem involving the volume of a sphere and its radius
MSC: Application
50. ANS: D PTS: 1 DIF: Easy REF: Section 2.6
OBJ: Solve a related rate problem involving the volume of a cube and the length of a side
MSC: Application
51. ANS: D PTS: 1 DIF: Difficult REF: Section 2.6
OBJ: Solve a related rate problem involving a cone MSC: Application
52. ANS: C PTS: 1 DIF: Medium REF: Section 2.6
OBJ: Solve a related rate problem involving a moving ladder MSC: Application
53. ANS: B PTS: 1 DIF: Medium REF: Section 2.6
OBJ: Solve a related rate problem involving a moving ladder and its internal angle
MSC: Application
54. ANS: E PTS: 1 DIF: Difficult REF: Section 2.6
OBJ: Solve a related rate problem involving a man walking away from a light source
MSC: Application

55. ANS: C PTS: 1 DIF: Difficult REF: Section 2.6
OBJ: Solve a related rate problem involving a man walking away from a light source
MSC: Application
56. ANS: E PTS: 1 DIF: Difficult REF: Section 2.6
OBJ: Solve a related rate problem involving a man walking away from a light source
MSC: Application
57. ANS: E PTS: 1 DIF: Medium REF: Section 2.6
OBJ: Solve a related rate problem involving the altitude of an airplane
MSC: Application