

Name: Last _____. First _____

You must show your work and/or provide explanations for your answers for all questions. Otherwise, no credit will be given.

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

Find the derivative.

1) $f(x) = \frac{5}{(2x - 3)^4}$ 1) _____

A) $f'(x) = \frac{5}{4(2x - 3)^3}$

B) $f'(x) = \frac{-40}{(2x - 3)^3}$

C) $f'(x) = \frac{-40}{(2x - 3)^5}$

D) $f'(x) = \frac{5}{8(2x - 3)^5}$

2) $f(x) = \frac{x+9}{\sqrt{x}}$, find $f'(x)$ 2) _____

A) $\frac{1}{\sqrt{x}} + \frac{9}{x^{3/2}}$

B) $\frac{1}{2\sqrt{x}} - \frac{9}{2x^{3/2}}$

C) $\frac{1}{2\sqrt{x}} - \frac{9}{2x}$

D) $x^{3/2} + 9\sqrt{x}$

3) $f(x) = 2x^4 - 6x^3 + 1$, find $f'(x)$ 3) _____

A) $8x^3 - 18x^2$

B) $4x^3 + 3x^2 - 7$

C) $8x^3 - 18x^2 - 7$

D) $4x^3 + 3x^2$

4) $g(x) = 4x^5 + x^4 - 4x^2 + 7$, find $g'(-1)$ 4) _____

A) 24

B) 28

C) 4

D) 16

5) $y = (3x^2 + 5x + 1)^{3/2}$ 5) _____

A) $\frac{dy}{dx} = (6x + 5)(3x^2 + 5x + 1)^{1/2}$

B) $\frac{dy}{dx} = \frac{3}{2}(3x^2 + 5x + 1)^{1/2}$

C) $\frac{dy}{dx} = (3x^2 + 5x + 1)^{1/2}$

D) $\frac{dy}{dx} = \frac{3}{2}(6x + 5)(3x^2 + 5x + 1)^{1/2}$

Solve the problem. Round your answer, if appropriate.

6) Water is discharged from a pipeline at a velocity v (in ft/sec) given by $v = 1868p^{(1/2)}$, where p is the pressure (in psi). If the water pressure is changing at a rate of 0.372 psi/sec, find the acceleration (dv/dt) of the water when $p = 39.0$ psi. 6) _____

A) 150 ft/sec²

B) 58.3 ft/sec²

C) 2170 ft/sec²

D) 55.6 ft/sec²

Solve the problem.

- 7) The polynomial $C(x) = -0.006x^4 + 0.140x^3 - 0.53x^2 + 1.79x$ measures the concentration of a dye in the bloodstream x seconds after it is injected. Find the rate of change of concentration with respect to time. 7) _____

A) $\frac{dC}{dt} = -0.024x^4 + 0.420x^3 - 1.06x^2 + 1.79x$

B) $\frac{dC}{dt} = -0.018x^3 + 0.280x^2 - 0.53x + 1.79$

C) $\frac{dC}{dt} = -0.006x^3 + 0.140x^2 - 0.53x + 1.79$

D) $\frac{dC}{dt} = -0.024x^3 + 0.420x^2 - 1.06x + 1.79$

- 8) A cube 4 inches on an edge is given a protective coating 0.2 inches thick. About how much coating should a production manager order for 800 cubes? $V = x^3$, where x = length of edge. 8) _____

Use differentials to solve the problem.

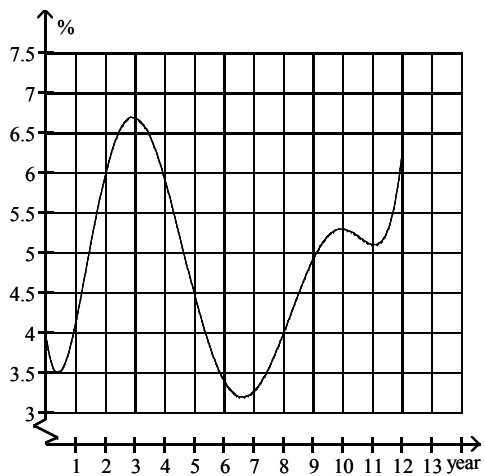
A) About 7680 in.²

B) About 10,240 in.³

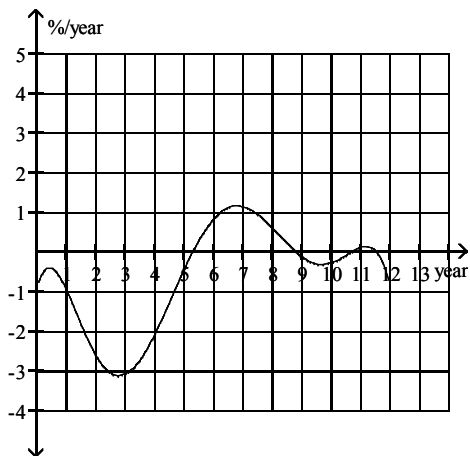
C) About 15,360 in.³

D) About 2560 in.²

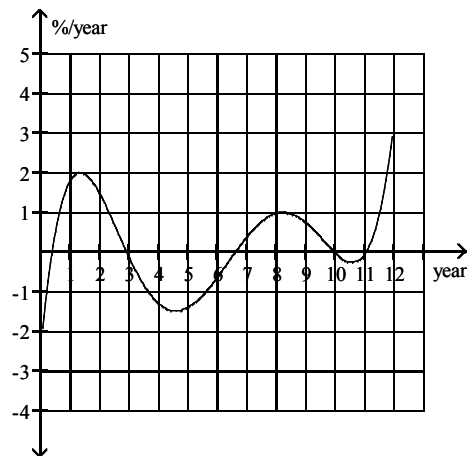
9) The graph shows the yearly average interest rates for 30-year mortgages for years since 1988 (Year 0 corresponds to 1988). Sketch a graph of the rate of change of interest rates with respect to time.



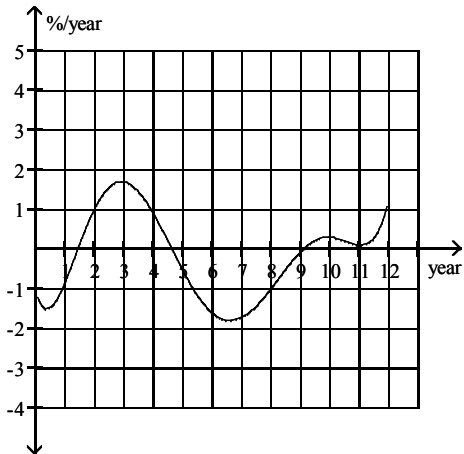
A)



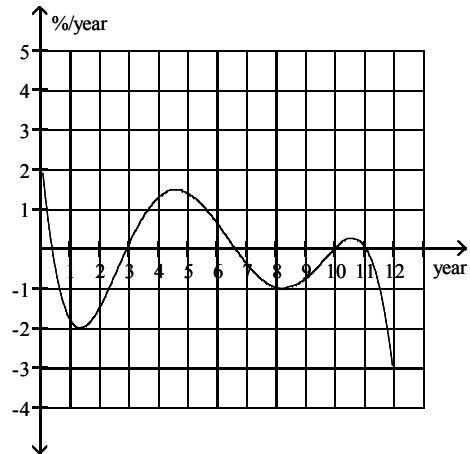
B)



C)



D)



- 10) The power P (in W) generated by a particular windmill is given by $P = 0.015 V^3$ where V is the velocity of the wind (in mph). Find the instantaneous rate of change of power with respect to velocity when the velocity is 9.9 mph. Round your answer to the nearest tenth. 10) _____
- A) 9.8 W/mph B) 4.4 W/mph C) 29.1 W/mph D) 0.4 W/mph

- 11) Boyle's law states that if the temperature of a gas remains constant, then $PV = c$, where P is the pressure, V is the volume, and c is a constant. Given a quantity of gas at constant temperature, if V is decreasing at a rate of $15 \text{ in.}^3/\text{s}$, at what rate is P increasing when $P = 30 \text{ lb/in.}^2$ and $V = 80 \text{ in.}^3$? Hint: Use implicit differentiation. 11) _____
- A) $40 \text{ lb/in.}^2\text{-s}$ B) $160 \text{ lb/in.}^2\text{-s}$ C) $\frac{9}{64} \text{ lb/in.}^2\text{-s}$ D) $\frac{45}{8} \text{ lb/in.}^2\text{-s}$

Find the derivative of y with respect to x .

- 12) $y = 2 \sin^{-1}(4x^3)$ 12) _____
- A) $\frac{24x^2}{1 - 16x^6}$ B) $\frac{24x^2}{\sqrt{1 - 16x^3}}$ C) $\frac{2}{\sqrt{1 - 16x^6}}$ D) $\frac{24x^2}{\sqrt{1 - 16x^6}}$

The function $s = f(t)$ gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

- 13) $s = -t^3 + 6t^2 - 6t$, $0 \leq t \leq 6$ 13) _____
- Find the body's velocity and acceleration at the end of the time interval.
- A) 42 m/sec, -6 m/sec^2 B) 42 m/sec, -24 m/sec^2
 C) -42 m/sec , -24 m/sec^2 D) 6 m/sec, 0 m/sec^2

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

Find the derivative of the given function. You don't have to simplify. Just show me how to do it.

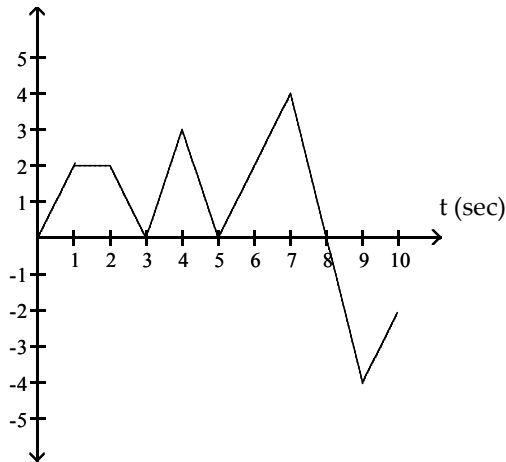
- 14) $(3x^2 + 3x)^2$ 14) _____

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

The figure shows the velocity v or position s of a body moving along a coordinate line as a function of time t . Use the figure to answer the question.

15) s (m)

15) _____



When is the body moving forward?

A) $0 < t < 8$

B) $0 < t < 1, 3 < t < 4, 5 < t < 7$

C) $0 < t < 3, 3 < t < 5, 5 < t < 8$

D) $0 < t < 1, 3 < t < 4, 5 < t < 7, 9 < t < 10$

Use implicit differentiation to find dy/dx .

16) $x^6 - 2x^4 - y^3 = 10$

16) _____

A) $\frac{x^5 - 8x^3}{y^2}$

B) $\frac{6x^5 - 8x^3}{3y^2}$

C) $\frac{-8x^3}{6x^5 - 8x^3}$

D) $\frac{6x^4 - 8x^3}{3y^2}$

Find the derivative of the function.

17) $y = \frac{x^3}{x-1}$

17) _____

A) $y' = \frac{-2x^3 - 3x^2}{(x-1)^2}$

B) $y' = \frac{-2x^3 + 3x^2}{(x-1)^2}$

C) $y' = \frac{2x^3 - 3x^2}{(x-1)^2}$

D) $y' = \frac{2x^3 + 3x^2}{(x-1)^2}$

Find dy/dx by implicit differentiation.

18) $xy + x + y = x^2y^2$

18) _____

A) $\frac{2xy^2 + y}{2x^2y - x}$

B) $\frac{2xy^2 + y + 1}{-2x^2y - x - 1}$

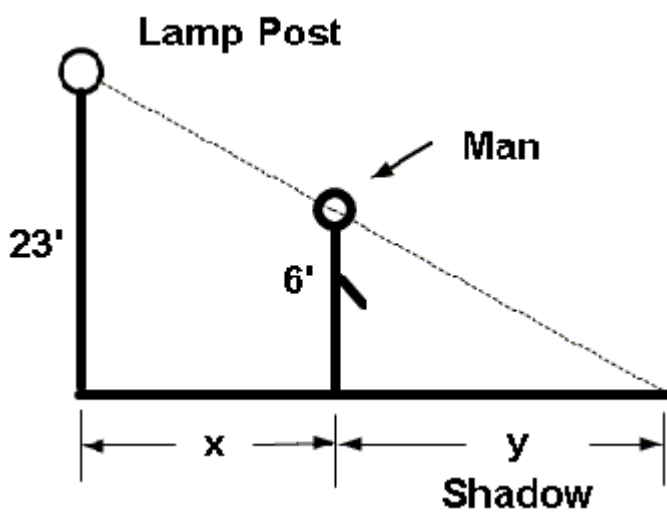
C) $\frac{2xy^2 - y - 1}{-2x^2y + x + 1}$

D) $\frac{2xy^2 - y}{2x^2y + x}$

19)

19) _____

A man 6 ft tall walks at a rate of 5 ft/s away from a lamppost that is 23 ft high. At what rate is the length of his shadow changing when he is 60 ft away from the lamppost?



A) $\frac{15}{29}$ ft/s

B) 50 ft/s

C) $\frac{30}{17}$ ft/s

D) $\frac{30}{29}$ ft/s

Answer Key

Testname: MATH1540-Q2-EXTRA PRACTICE

- 1) C
- 2) B
- 3) A
- 4) A
- 5) D
- 6) D
- 7) D
- 8) A
- 9) B
- 10) B
- 11) D
- 12) D
- 13) C
- 14) $36x^3 + 54x^2 + 18x$
- 15) D
- 16) B
- 17) C
- 18) C
- 19) C