

Don't forget to bubble in your name and ID on the scantron.

ANSWER KEY

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

Find the limit.

1) $\lim_{x \rightarrow 0} \frac{x^3 - 6x + 8}{x - 2}$

~~A) -4~~

B) 4

C) Does not exist

D) 0

1) A

Solve the problem.

2) If $f(x) = \sqrt{x+3}$ and $g(x) = 8x - 7$, find $f(g(x))$.

A) $2\sqrt{2x+1}$

B) $8\sqrt{x-4}$

C) $8\sqrt{x+3} - 7$

~~D) $2\sqrt{2x-1}$~~

2) D

Solve the equation.

3) $\log_2 x = 5$

A) $x = 25$

B) $x = 10$

C) $x = 2.32$

~~D) $x = 32$~~

3) D

Express as a single logarithm and, if possible, simplify.

4) $\ln \cos \theta - \ln \left(\frac{\cos \theta}{8} \right)$

~~A) $\ln 8$~~

B) $\ln \left(\frac{\cos 2\theta}{8} \right)$

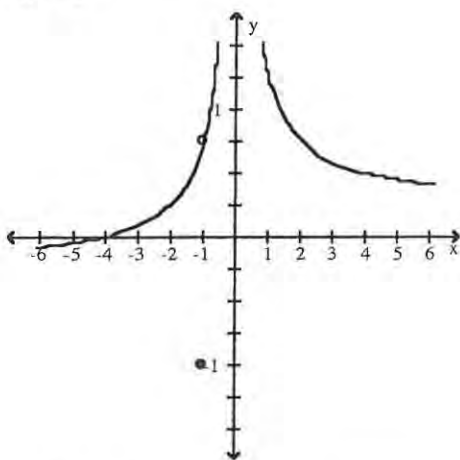
C) $\ln \cos \theta$

D) $\ln \left(\frac{1}{8} \right)$

4) A

Use the graph to evaluate the limit.

5) $\lim_{x \rightarrow -1} f(x)$



A) -1

B) $-\frac{3}{4}$

~~C) $\frac{3}{4}$~~

D) ∞

5) C

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

6) $y = x^2 + 5x$, $x = 2$

A) $m = 14$

~~B) $m = 9$~~

C) $m = 4$

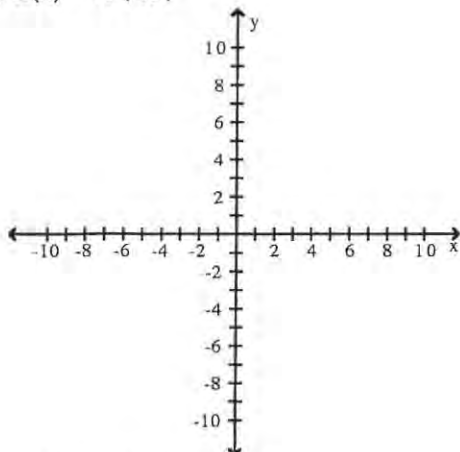
D) $m = 7$

6) B

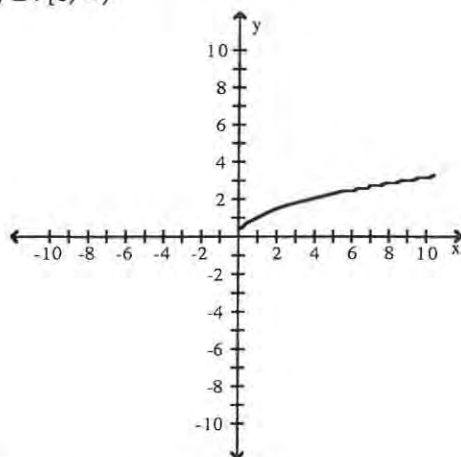
Find the domain and graph the function.

7) $G(x) = \sqrt{|x|}$

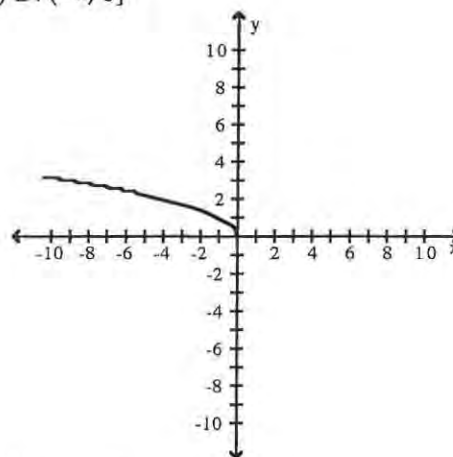
7) C



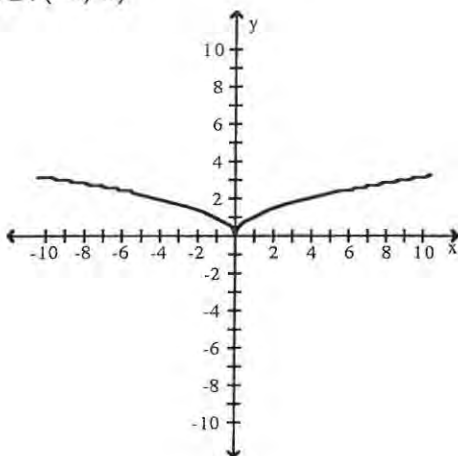
A) $D: [0, \infty)$



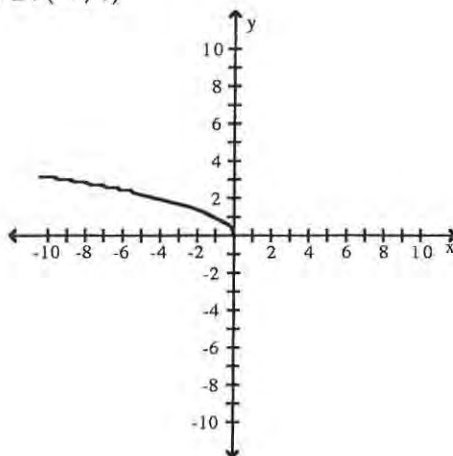
B) $D: (-\infty, 0]$



~~C) $D: (-\infty, \infty)$~~



D) $D: (-\infty, 0)$



Find the average velocity of the function over the given interval.

8) $y = \sqrt{2t}$, $[2, 8]$

8) A

~~A) $\frac{1}{3}$~~

B) $-\frac{3}{10}$

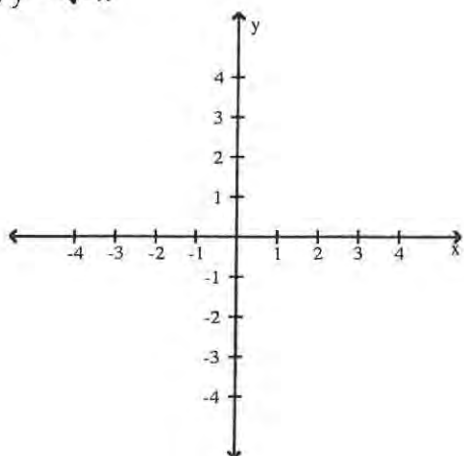
C) 7

D) 2

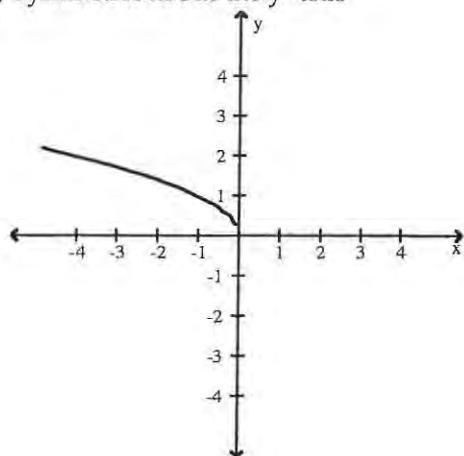
Graph the function. Determine the symmetry, if any, of the function.

9) $y = \sqrt{-x}$

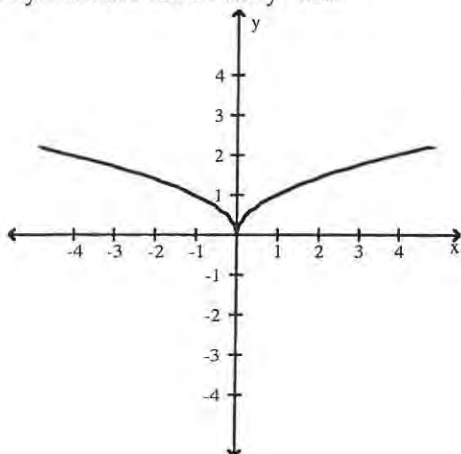
9) B



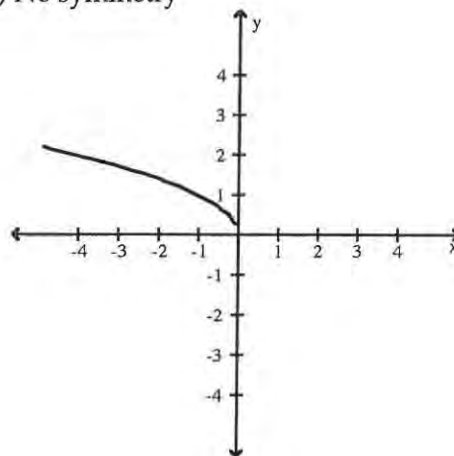
A) Symmetric about the y-axis



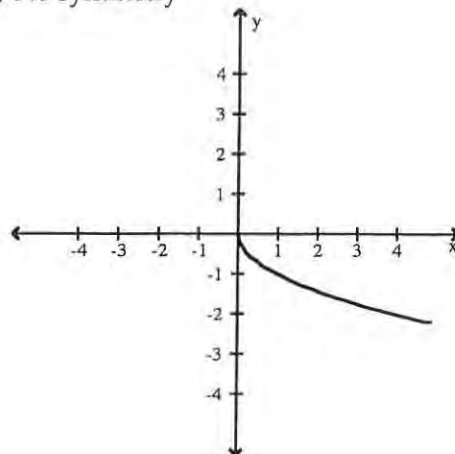
C) Symmetric about the y-axis



~~B) No symmetry~~



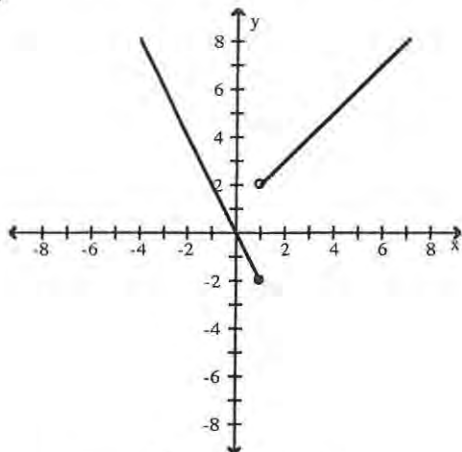
D) No symmetry



Find a formula for the function graphed.

10)

10) C



A) $f(x) = \begin{cases} x, & x \leq 1 \\ 2x+1, & x > 1 \end{cases}$

B) $f(x) = \begin{cases} 2x, & x \leq 1 \\ x+1, & x > 1 \end{cases}$

~~C~~ $f(x) = \begin{cases} -2x, & x \leq 1 \\ x+1, & x > 1 \end{cases}$

D) $f(x) = \begin{cases} -2x, & x \leq 1 \\ x+2, & x > 1 \end{cases}$

Determine the limit by sketching an appropriate graph.

11) $\lim_{x \rightarrow 6^+} f(x)$, where $f(x) = \begin{cases} -4x - 3 & \text{for } x < 6 \\ 5x - 2 & \text{for } x \geq 6 \end{cases}$

11) B

A) -1

~~B~~ 28

C) -27

D) -2

Find the limit, if it exists.

12) $\lim_{x \rightarrow 2} \frac{x^2 + 2x - 8}{x^2 - 4}$

12) D

A) $-\frac{1}{2}$

B) Does not exist

C) 0

~~D~~ $\frac{3}{2}$

Provide an appropriate response.

13) The inequality $1 - \frac{x^2}{2} < \frac{\sin x}{x} < 1$ holds when x is measured in radians and $|x| < 1$.

13) D

Find $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ if it exists.

A) 0.0007

B) does not exist

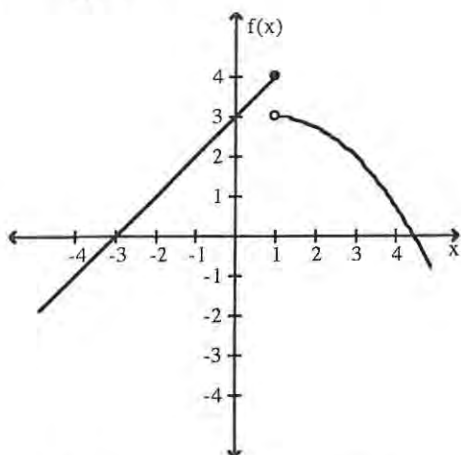
C) 0

~~D~~ 1

For the function f whose graph is given, determine the limit.

14) Find $\lim_{x \rightarrow 1^+} f(x)$.

14) A



~~A) 3~~

B) 4

C) $3\frac{1}{2}$

D) does not exist

Find the limit.

15) $\lim_{x \rightarrow 3^+} \frac{2}{x^2 - 9}$

15) D

A) 0

B) $-\infty$

C) 1

~~D) ∞~~

Find all vertical asymptotes of the given function.

16) $f(x) = \frac{x(x-1)}{x^3 - 4x}$

16) B

A) $x = 0, x = -2, x = 2$

~~B) $x = -2, x = 2$~~

C) $x = 0$

D) $x = 0, x = -4$

Find the limit.

17) $\lim_{x \rightarrow -\infty} \frac{\sqrt[3]{x+3x+5}}{6x+x^{2/3}+7}$

17) A

~~A) $\frac{1}{2}$~~

B) 0

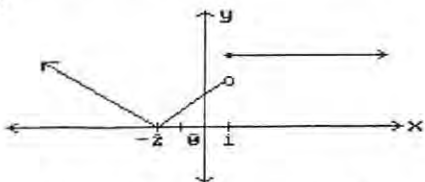
C) 2

D) $-\infty$

Find all points where the function is discontinuous.

18)

18) C



A) $x = -2$

B) $x = -2, x = 1$

~~C) $x = 1$~~

D) None

Find the number k , so that f is continuous at every point.

19)

$$f(x) = \begin{cases} x^2, & \text{if } x \leq 4 \\ x + k, & \text{if } x > 4 \end{cases}$$

A) $k = 20$

B) $k = -4$

~~C) $k = 12$~~

D) Impossible

19) C

Find the intervals on which the function is continuous.

20) $y = \frac{4}{|x| + 2} - \frac{x^2}{3}$

A) discontinuous only when $x = -2$

~~B) continuous everywhere~~

C) discontinuous only when $x = -3$ or $x = -2$

D) discontinuous only when $x = -5$

20) B

Find an equation for the tangent to the curve at the given point.

21) $y = x - x^2$, $(-1, -2)$

A) $y = -x - 1$

B) $y = -3x + 1$

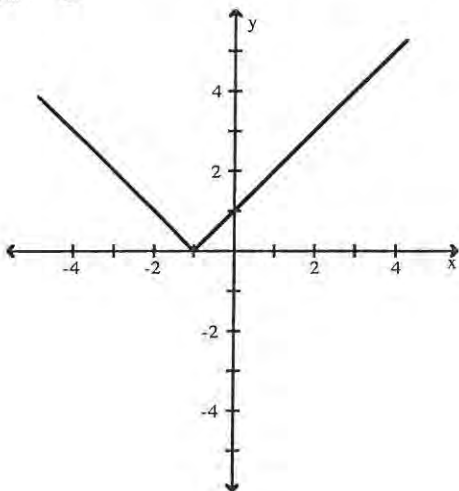
C) $y = -x + 1$

~~D) $y = 3x + 1$~~

21) D

The figure shows the graph of a function. At the given value of x , does the function appear to be differentiable, continuous but not differentiable, or neither continuous nor differentiable?

22) $x = -1$



A) Differentiable

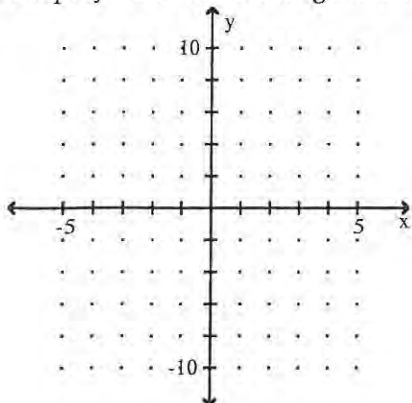
~~B) Continuous but not differentiable~~

C) Neither continuous nor differentiable

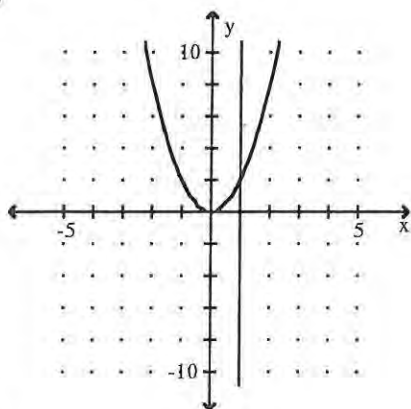
22) B

23) Graph $y = 2x^2$ and the tangent to the curve at the point whose x-coordinate is 1.

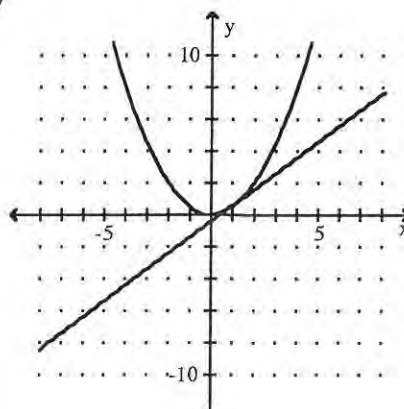
23) C



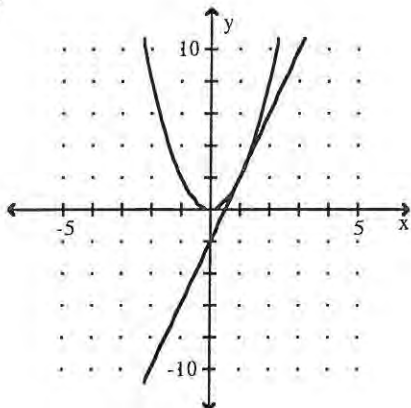
A)



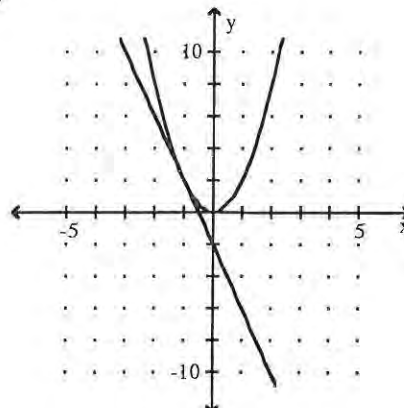
B)



~~C)~~



D)



Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x . Find the derivative with respect to x of the given combination at the given value of x .

24)

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	16	8	5
4	3	3	5	-6

24) D

$\sqrt{f(x) + g(x)}, x = 3$

A) $\frac{13}{\sqrt{17}}$

B) $-\frac{1}{2\sqrt{17}}$

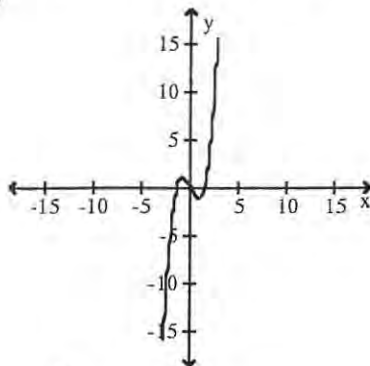
C) $\frac{1}{2\sqrt{17}}$

~~D)~~ $\frac{13}{2\sqrt{17}}$

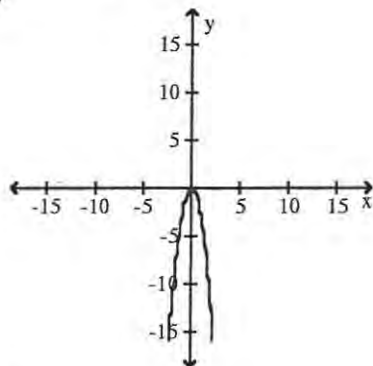
The graph of a function is given. Choose the answer that represents the graph of its derivative.

25)

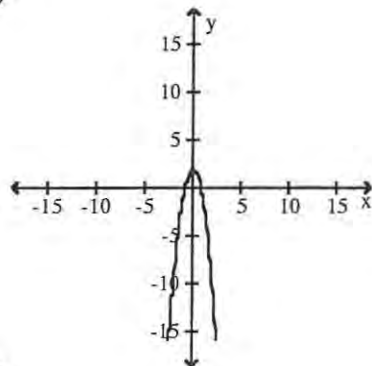
25) D



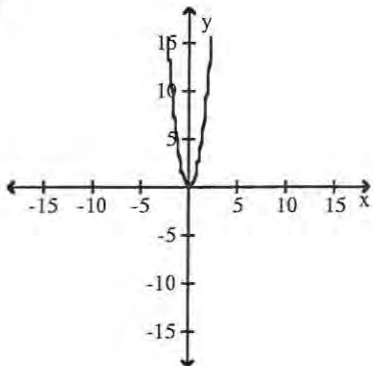
A)



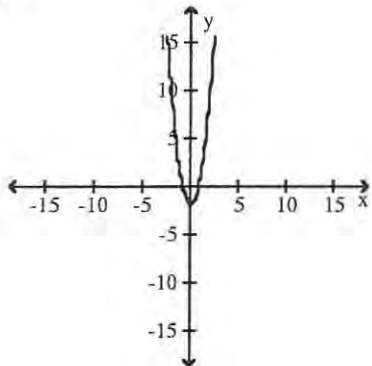
B)



C)



~~D)~~



Provide an appropriate response.

26) Find all points (x, y) on the graph of $f(x) = 2x^2 - 3x$ with tangent lines parallel to the line $y = 5x + 7$.

26) A

~~A)~~ (2, 2)

B) (0, 0), (2, 2)

C) (4, 2)

D) (2, 8)

Find y' .

27) $y = (4x^3 + 6)(2x^7 - 7)$

27) B

A) $80x^9 + 84x^6 - 84x$

B) $16x^9 + 84x^6 - 84x$

C) $16x^9 + 84x^6 - 84x^2$

~~D)~~ $80x^9 + 84x^6 - 84x^2$

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

28) $s = -6 + 5 \cos t$

28) B

Find the body's acceleration at time $t = \pi/3$ sec.

A) $\frac{5}{2}$ m/sec²

~~B) $-\frac{5}{2}$ m/sec²~~

C) $\frac{5\sqrt{3}}{2}$ m/sec²

D) $-\frac{5\sqrt{3}}{2}$ m/sec²

Find the derivative.

29) $s = \frac{3e^t}{2e^t + 1}$

29) A

~~A) $\frac{3e^t}{(2e^t + 1)^2}$~~

B) $\frac{e^t}{(2e^t + 1)^2}$

C) $\frac{3e^t}{(2e^t + 1)^3}$

D) $\frac{3e^t}{(2e^t + 1)}$

Solve the problem. Round your answer, if appropriate.

30) The radius of a right circular cylinder is increasing at the rate of 4 in./sec, while the height is decreasing at the rate of 9 in./sec. At what rate is the volume of the cylinder changing when the radius is 6 in. and the height is 12 in.? (Recall that the volume of a right circle cylinder is given by $V = \pi r^2 h$.)

30) D

A) $-36 \text{ in.}^3/\text{sec}$

B) $-36\pi \text{ in.}^3/\text{sec}$

C) $-42 \text{ in.}^3/\text{sec}$

~~D) $252\pi \text{ in.}^3/\text{sec}$~~

Use logarithmic differentiation to find the derivative of y with respect to the independent variable.

31) $y = (x+10)^x$

31) D

A) $\ln(x+10) + \frac{x}{x+10}$

B) $x \ln(x+10)$

C) $x + (10)^{x-1}$

~~D) $(x+10)^x \left[\ln(x+10) + \frac{x}{x+10} \right]$~~

Find the derivative of y with respect to x .

32) $y = 2 \sin^{-1}(5x^3)$

32) C

A) $\frac{30x^2}{1-25x^6}$

B) $\frac{30x^2}{\sqrt{1-25x^3}}$

~~C) $\frac{30x^2}{\sqrt{1-25x^6}}$~~

D) $\frac{2}{\sqrt{1-25x^6}}$

At the given point, find the slope of the curve.

33) $y^6 + x^3 = y^2 + 9x$, slope at $(0, 1)$

33) D

A) $\frac{3}{2}$

B) $\frac{9}{8}$

C) $-\frac{3}{2}$

~~D) $\frac{9}{4}$~~

Solve the problem.

34) The driver of a car traveling at 60 ft/sec suddenly applies the brakes. The position of the car is $s = 60t - 3t^2$, t seconds after the driver applies the brakes. How many seconds after the driver applies the brakes does the car come to a stop?

34) C

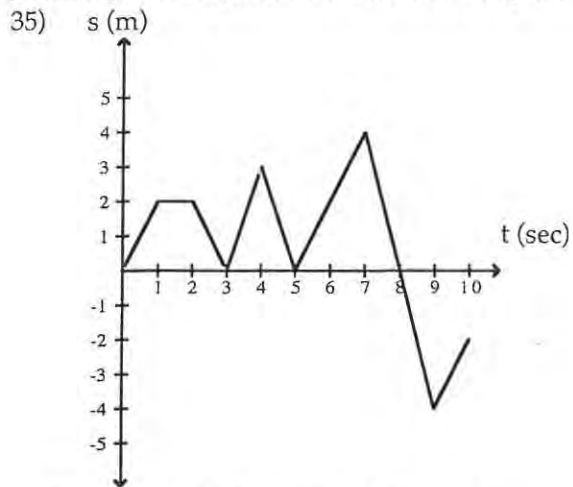
A) 60 sec

B) 30 sec

~~C) 10 sec~~

D) 20 sec

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



35) B

When is the body moving backward?

A) $8 < t \leq 10$

C) $8 < t < 9$

~~B)~~ $2 < t < 3, 4 < t < 5, 7 < t < 9$

D) $2 < t < 3, 4 < t < 5, 7 < t < 8$