

Name: _____ Class: _____ Date: _____

Do Not Use Calculator

- 1) A penny is dropped from the top of a waterfall. What is the instantaneous speed of the penny exactly 6 seconds after it was dropped? 1) _____

Hint: use $y = 16t^2$ feet in t seconds.

- A) 1152 feet/second B) 576 feet/second C) 96 feet/second D) 192 feet/second

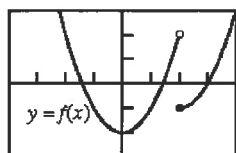
- 2) Given that $f(x)$ and $g(x)$ are defined for all x and: 2) _____

$\lim_{x \rightarrow c} f(x) = 4$ and $\lim_{x \rightarrow c} g(x) = 9$

what is $\lim_{x \rightarrow c} \frac{3f(x) + g(x)}{f(x)}$?

- A) 9.75 B) 12 C) 5.25 D) 3.44

- 3) Use the graph to estimate the limits and value of the function, or explain why the limits do not exist. 3) _____



[-4, 4] by [-3, 3]

- (a) $\lim_{x \rightarrow 2^-} f(x)$
 (b) $\lim_{x \rightarrow 2^+} f(x)$
 (c) $\lim_{x \rightarrow 2} f(x)$
 (d) $f(2)$

- 4) Use the Sandwich Theorem to find the following limit. 4) _____

$\lim_{x \rightarrow 0} (7 - x^2 \sin \frac{1}{x})$

- 5) Find $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x^3 - 64}$ if it exists. 5) _____

- A) $-\frac{1}{6}$ B) 0 C) $\frac{1}{6}$ D) does not exist

- 6) Find $\lim_{x \rightarrow \infty} \frac{3x^4 + 6x - 3}{7x^3 + 9}$. 6) _____

- A) $\frac{3}{7}$ B) $-\infty$ C) ∞ D) 0

7) Does the graph of $f(x) = \frac{6x^2 + 2x - 4}{2x^2 + 3x + 2}$ have a horizontal asymptote? If so, what is it?

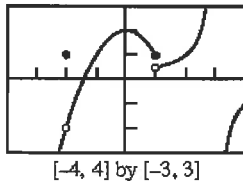
7) _____

- A) Yes, $y = 2$ B) Yes, $y = -3$ C) Yes, $y = 3$ D) Yes, $y = 4$ E) No

Do Not Use Calculator

8) Find the points of discontinuity of the function whose graph is shown here.

8) _____



For each discontinuity, identify the type of discontinuity (removable, jump, infinite, or oscillating)

9) Find the points of discontinuity of the function

9) _____

$$y = \frac{x^2 + 13x + 42}{x^2 - 36}$$

For each discontinuity, identify the type of discontinuity (removable, jump, infinite, or oscillating).

- | | |
|--|--|
| A) Removable discontinuity at $x = -6$;
infinite discontinuity at $x = 7$. | B) Oscillating discontinuity at $x = 6$;
removable discontinuity at $x = -6$. |
| C) Removable discontinuity at $x = -7$;
removable discontinuity at $x = 7$. | D) Removable discontinuity at $x = -6$;
infinite discontinuity at $x = 6$. |

10) Find a value of a so that the function

10) _____

$$f(x) = \begin{cases} 6x - 5, & x < 4 \\ ax^2, & x \geq 4 \end{cases} \text{ is continuous.}$$

- A) $a = \frac{19}{4}$ B) $a = \frac{6}{4}$ C) $a = 16$ D) $a = \frac{19}{16}$

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11) Find the slope, m , of the curve $y = 2x^3 + 14$ at $x = 4$.

11) _____

- A) $m = 110$ B) $m = 142$ C) $m = 384$ D) $m = 96$

12) Find the equation of the tangent line to the curve $f(x) = 4x^2$ at the point $(2, 16)$.

12) _____

13) Find the equation of the normal line to the curve $f(x) = 2x^2$ at the point $(2, 8)$.

13) _____

14) For the function $f(x) = 3x^2$ at the point (4, 48), find:

14) _____

- (a) the slope of the curve
- (b) an equation of the tangent line
- (c) an equation of the normal line

- A) (a) $m = 24$
 (b) $y = 24x - 48$
 (c) $y = 24x + 48$

- B) (a) $m = \frac{1}{24}$
 (b) $y = \frac{1}{24}x - \frac{1}{48}$
 (c) $y = 24x + 48$

- C) (a) $m = 24$
 (b) $y = 24x - 48$
 (c) $y = \frac{1}{24}x + 48 \frac{1}{6}$

- D) (a) $m = \frac{1}{24}$
 (b) $y = \frac{1}{24}x + 48 \frac{1}{6}$
 (c) $y = 24x - 48$

15) Find the average rate of change of $f(x) = x^3$ over the interval $[-1, 3]$.

15) _____

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16) Use the definition of derivative to find the derivative of

16) _____

$f(x) = x^2 - 3x + 21$ at $x = 4$

Show your work.

17) Use the definition $f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$

17) _____

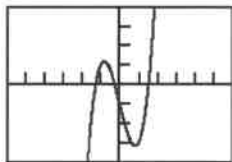
to find the derivative of $f(x) = \frac{2}{x}$ at $x = 3$.

18) Use your graphing utility to graph $f(x) = 2x^3 - 4x + 4$ and its derivative on the same set of axes in the viewing window $[-3, 3]$ by $[-5, 15]$.

18) _____

19) Name the function that could be the derivative of the function graphed below.

19) _____



$[-6, 6]$ by $[-4, 4]$

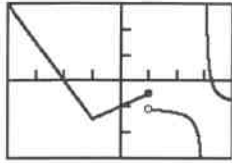
A) $\ln(x)$

B) $6x^2 - 4$

C) $\sin(x)$

D) $6x$

20) The graph of $y = f(x)$ is shown below. At what values of x does $f(x)$ appear to be nondifferentiable? 20) _____



$[-4, 4]$ by $[-3, 3]$

- A) $x = -1, x = 1, x = 3$
 C) $x = -1, x = 1$

- B) $x = 1, x = 3$
 D) $x = -1, x = 1, x = -3$

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21) What is the derivative of the function $f(x) = -26$. Explain your answer graphically. 21) _____

- (a) $f'(x) = -26$
 (b) $f'(x) = -26x$
 (c) $f'(x) = -13$
 (d) $f'(x) = 0$

22) Find y'' if $y = 4x^4 + 4x^3 - \frac{1}{2}x^2 - 17x - 5$. 22) _____

- A) $y'' = 48x^2 + 24x - 1$
 C) $y'' = 16x^2 + 12x - 1$

- B) $y'' = 16x^2 + 12x - 17$
 D) $y'' = 48x^2 + 24x - 17$

23) Suppose that u and v are differentiable at $x = -2$, and that $u(-2) = 6, v(-2) = -1, u'(-2) = -2$, and $v'(-2) = 4$. 23) _____

Find $\frac{d}{dx} \left(\frac{u}{v} \right)$ at $x = -2$

- A) 3 B) 26 C) $-\frac{1}{22}$ D) -22

24) Find y'' if $y = 5x^{-4}$. Express your answer as a rational expression. 24) _____

25) Find an equation for the line tangent to the graph 25) _____

$y = \cos x - 2$ at $x = \frac{\pi}{2}$.

After finding the equation without a calculator, use your graphing utility to support your answer graphically.

26) Find the derivative of $y = \sin x + \sec x + 23$. 26) _____

Support your answer by comparing the graph of your result with the graph of the numerical derivative.

27) Find y' if $y = \frac{\sin x}{6 + \sin x}$

27) _____

Do Not Use Calculator

28) A curve is parametrized by the equations $x = \sin t$ and $y = -5t + 15$.

28) _____

Find $\frac{dy}{dx}$ at the point defined by $t = \frac{2\pi}{3}$.

A) $\frac{dy}{dx} = 10$

B) $\frac{dy}{dx} = \frac{1}{10}$

C) $\frac{dy}{dx} = -10$

D) $\frac{dy}{dx} = -\frac{1}{10}$

29) A curve is defined parametrically by

29) _____

$x = \tan t$ and $y = 3t^2 - 16$.

Find $\frac{dy}{dx}$ as a function of t .

A) $\frac{dy}{dx} = \frac{6t}{\tan t}$

B) $\frac{dy}{dx} = \frac{6t - 16}{\tan t}$

C) $\frac{dy}{dx} = \frac{6t - 16}{\sec^2 t}$

D) $\frac{dy}{dx} = \frac{6t}{\sec^2 t}$

30) Find $\frac{dy}{dx}$ if $y = (7x + 7)^9$.

30) _____

A) $\frac{dy}{dx} = 63x^8(7x + 7)$

B) $\frac{dy}{dx} = 63(7x + 7)^9$

C) $\frac{dy}{dx} = 63(7x + 7)^8$

D) $\frac{dy}{dx} = 9(7x + 7)^8$

31) Find the derivative of $f(x) = -\cos(2x^2 + 12)$.

31) _____

32) Find $\frac{dy}{dt}$ by the Chain Rule, and express the results in terms of t if

32) _____

$y = \sqrt{3x - 9}$ and $x = 5t^2 + 14t$.

Do Not Use Calculator

33) Use implicit differentiation to find $\frac{dy}{dx}$ if

33) _____

$x^7 - 8xy + y^4 = 7$

34) Assume that y is a differentiable function of x .

34) _____

Use implicit differentiation to find $\frac{dy}{dx}$ for

$2x^5 + 5 \cos(xy) = 19$

35) Find $\frac{dy}{dx}$ if $y = \tan^{-1}(3x)$. 35) _____

Support your answer graphically.

A) $\frac{dy}{dx} = \frac{3x}{1+9x^2}$ B) $\frac{dy}{dx} = \frac{3}{1+9x^2}$ C) $\frac{dy}{dx} = \frac{-3}{1+9x^2}$ D) $\frac{dy}{dx} = \frac{1}{1+9x^2}$

36) Find $\frac{dy}{dx}$ if $y = 5 \cot^{-1}(-x)$. 36) _____

37) Which expression is equivalent to $\cot^{-1} x$? 37) _____

A) $\tan^{-1}\left(\frac{1}{x}\right)$ B) $\tan^{-1}\left(\frac{\pi}{2} - x\right)$ C) $\frac{\pi}{2} - \tan^{-1} x$ D) $\frac{\cos^{-1} x}{\sin^{-1} x}$ E) $\frac{1}{\cot x}$

Do Not Use Calculator

38) Given $f(x) = 2e^{5x}$, find $f''(x)$. 38) _____

A) $f''(x) = 50e^{5x}$ B) $f''(x) = 2e^{5x}$ C) $f''(x) = 50e^{3x}$ D) $f''(x) = 10e^{5x}$

39) Find $\frac{dy}{dx}$ if $y = 4^{-5x}$. 39) _____

A) $\frac{dy}{dx} = -20 \ln(4)$ B) $\frac{dy}{dx} = 4^{-5x} \ln(4)$
 C) $\frac{dy}{dx} = -20 \cdot 4^{-5x} \ln(4)$ D) $\frac{dy}{dx} = -5 \cdot 4^{-5x} \ln(4)$

40) If $y = 4x^9 \ln(9x^8)$, find $\frac{dy}{dx}$. 40) _____

Do Not Use Calculator

41) Determine where $y = 7x^3 - 4x^2 - 4x + 15$ has local maximum or minimum values. 41) _____

A) local max where $x = \frac{2}{3}$ B) local max where $x = \frac{2}{7}$
 local min where $x = -\frac{2}{7}$ local min where $x = -\frac{2}{3}$
 C) local max where $x = -\frac{2}{3}$ D) local max where $x = -\frac{2}{7}$
 local min where $x = \frac{2}{7}$ local min where $x = \frac{2}{3}$

42) Find the absolute maximum value of the function $f(x) = -\frac{x^4}{4} + 2x^3 + 8x^2$. 42) _____

Support your answer graphically.

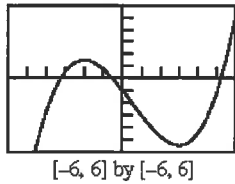
A) 8 B) -2 C) 512 D) 12

- 43) Suppose $f'(-1) = 0$, $f(x) > 0$ to the right of $x = -1$, and $f(x) > 0$ to the left of $x = -1$. Does f have a relative minimum, a relative maximum, or neither at $x = -1$? Explain your answer. 43) _____

Do Not Use Calculator

- 44) $f(x) = -2x^2 - 3x - 12$ is continuous on $[-1, 0]$ and differentiable on $(-1, 0)$. Then, according to the Mean Value Theorem, there is at least one point c in $(-1, 0)$ at which _____ 44) _____
 A) $f(c) = -4$ B) $f'(c) = -1$ C) $f(c) = -1$ D) $f'(c) = -4$

- 45) Find the interval or intervals on which the function whose graph is shown is increasing. 45) _____



- A) $[-3, 5]$ B) $(-\infty, -3] \cup [5, \infty)$ C) $(-\infty, -2] \cup [3, \infty)$ D) $[-2, 3]$

- 46) If $f(-26) = -7$, then $f(x)$ is _____ at $x = -26$. 46) _____

Do Not Use Calculator

- 47) For $y = x^4 - 12x^2 + 8$, use analytic methods to find the exact intervals on which the function is _____ 47) _____
 (a) concave up
 (b) concave down.
 Then
 (c) find any inflection points.

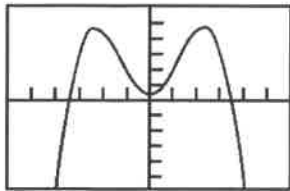
- 48) Let $y = e^{-2x}$ on the domain $[2, 3]$. Find the exact intervals on which the function is _____ 48) _____
 (a) increasing
 (b) decreasing
 Then
 (c) find any local extreme values.

- 49) Find the function whose derivative is $f'(x) = -6x + 8$ and whose graph passes through the point $P(-3, -63)$. Support your answer graphically. 49) _____
 A) $f(x) = -6$ B) $f(x) = -3x^2 + 8x$
 C) $f(x) = -6x - 12$ D) $f(x) = -3x^2 + 8x - 12$

- 50) Find the subinterval(s) of $[0, 2\pi]$ on which the graph of $\cos x$ is concave up. 50) _____
 A) $(\frac{\pi}{2}, \frac{3\pi}{2})$ B) $(0, \frac{\pi}{2}) \cup (\frac{3\pi}{2}, 2\pi)$
 C) $(0, \pi)$ D) $(\pi, 2\pi)$

- 51) Let $f(x) = x^4 + ax^2$. What is the value of a if f has a local minimum at $x = 5$? 51) _____
 A) $a = -50$ B) $a = 50$ C) $a = 0$ D) $a = -150$

- 52) Use the graph of $f'(x)$ to estimate the interval(s) on which the function f is increasing. 52) _____
 Explain your answer.



$[-6, 6]$ by $[-6, 6]$

- (a) $(-\infty, -3.5] \cup [3.5, \infty)$
 (b) $[-3.5, 3.5]$
 (c) $(-\infty, -2.4] \cup [0, 2.4]$
 (d) $[-1.41, 1.41]$

- 53) You are planning to make an open rectangular box from a 38- by 44-in. piece of cardboard by cutting congruent squares from the corners and folding up the sides. 53) _____
 (a) What are the dimensions of the box of largest volume that you can make this way?
 (b) What is its volume?

Do Not Use Calculator

- 54) Find the linearization $L(x)$ of $f(x) = -2x^2 + 5x + 10$ at $x = 7$. 54) _____
 A) $L(x) = x + 7$ B) $L(x) = -23x - 53$ C) $L(x) = -23x + 10$ D) $L(x) = -23x + 108$

- 55) If $f(x) = 4x^2 - 4x - 11$, 55) _____
 (a) find the linearization $L(x)$ at $x = -3$, and
 (b) use $L(x)$ to approximate $f(-3.002)$.

- 56) The equation $2x^3 + 5x^2 - 4x + \sin x = 0$ has a solution between -3 and -4 . Use Newton's method three times with $x_0 = -3.5$, to approximate the solution to three decimal places. 56) _____
 A) -3.198 B) -3.139 C) -3.196 D) -3.137

- 57) Let $y = \ln(6x + 7)$. 57) _____
 (a) Find dy and
 (b) estimate dy for $x = 8$ and $dx = 0.04$.

- 58) Two boats are approaching a buoy along paths that make a 90° angle. The first boat is 160 feet from the buoy and is traveling at a rate of 30 feet per second. The second boat is 135 feet from the buoy and is traveling at a rate of 35 feet per second. Find the rate of change of the distance between the boats. 58) _____
 A) -45.499 feet per second B) -90.998 feet per second
 C) 22.750 feet per second D) 45.499 feet per second

Do Not Use Calculator

59) Express $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n (4c_k^3 - 4c_k^2 + 1) \Delta x_k$ as a definite integral on the interval $[4, 8]$. 59) _____

A) $\int_4^8 (12x^2 - 8x + 1) dx$

B) $\int_4^8 (12x^2 - 8x) dx$

C) $\int_4^8 (4x^3 - 4x^2 + 1) dx$

D) $\int_8^4 (4x^3 - 4x^2 + 1) dx$

60) A car travels at a steady rate of 50 miles per hour from 7:00 a.m. to 4:00 p.m. Express the total distance traveled as an integral, and then evaluate the integral. Sketch a graph to support your answer. 60) _____

61) Use an area to evaluate $\int_a^{4a} 3x dx$ where $a > 1$. 61) _____

A) $\frac{45a^2}{2}$

B) $24a^2$

C) $9a$

D) $\frac{51a^2}{2}$

62) Suppose that 62) _____

$\int_0^4 f(x) dx = 6$, $\int_4^7 f(x) dx = 3$, and $\int_0^7 g(x) dx = 2$.

Which of the following statements is false? Explain.

(a) $\int_7^4 f(x) dx = -3$

(b) $\int_0^7 [f(x) + g(x)] dx = 11$

(c) $\int_0^7 [f(x)g(x)] dx = 18$

(d) $\int_0^7 [2f(x) - g(x)] dx = 16$

63) Find the average value of the function $y = -x^2 + 2x + 13$ over the interval $[3, 6]$. 63) _____

A) 1

B) 27

C) -1

D) 3

64) Evaluate the integral $\int_1^4 (5x^3 + 5x^2) dx$. 64) _____

65) Evaluate the integral $\int_0^1 e^x dx$. 65) _____

Do Not Use Calculator

66) Use the Fundamental Theorem of Calculus with the Chain Rule to find 66) _____

$\frac{dy}{dx}$ if $y = \int_8^{4x} (2 - 2t) dt$.

- A) $\frac{dy}{dx} = 8 - 8x$ B) $\frac{dy}{dx} = -32x$ C) $\frac{dy}{dx} = 2 - 2x$ D) $\frac{dy}{dx} = 8 - 32x$

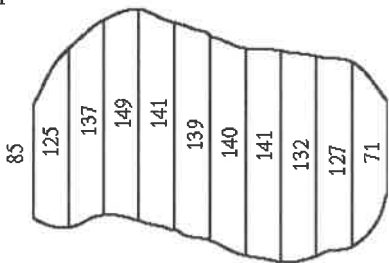
67) Use Part 1 of the Fundamental Theorem of Calculus to find 67) _____

$\frac{dy}{dx}$ if $y = \int_x^8 \sec^2 t dt$.

- A) $\frac{dy}{dx} = -\sec^2 x$ B) $\frac{dy}{dx} = -\tan x$ C) $\frac{dy}{dx} = \sec^2 x$ D) $\frac{dy}{dx} = \tan x$

68) Find the total area of the region between the curve $y = 1 - x^2$ and the x-axis on the interval $0 \leq x \leq 3$. 68) _____

69) A lake has the shape shown, where the measurements shown were taken at 15 foot intervals. Use Simpson's rule to find the area of the lake. 69) _____



- A) 28,427 ft² B) 19,635 ft² C) 19,900 ft² D) 25,875 ft² E) 19,830 ft²

70) Use the trapezoidal rule with $n = 4$ to estimate 70) _____

$\int_2^4 (3x^2 + 2) dx$.

Do Not Use Calculator

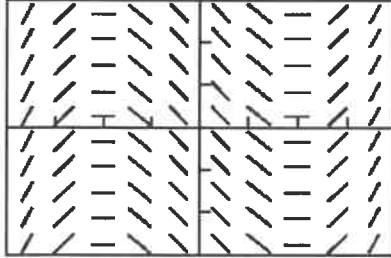
71) Solve the initial value problem.

$$\frac{dy}{dx} = 6x^3 - 10, \quad y(4) = 13$$

71) _____

72) Draw a possible graph for the function f with the given slope field that satisfies $y(0) = 1$.

72) _____



$[-4, 4]$ by $[-3, 3]$

73) Evaluate the integral $\int (x^{-4} - 8x^9) dx$.

73) _____

74) Evaluate the integral $\int 12 \sec t \tan t dt$.

74) _____

A) $\sec t + C$

B) $12 \sec t + C$

C) $\sec^2 t + C$

D) $12 \tan^2 t + C$

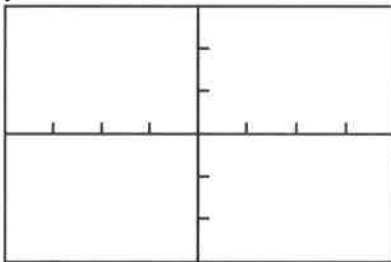
75) Solve the initial value problem.

75) _____

Support your answer by overlaying your solution on a slope field for the differential equation.

$$\frac{dy}{dx} = 3x^2 - 2$$

$$y(-1) = 1$$



$[-4, 4]$ by $[-3, 3]$

76) Evaluate the integral $\int (e^{t/15} + \frac{11}{t^3}) dt$.

76) _____

Do Not Use Calculator

77) Use substitution to evaluate $\int_0^2 e^{3x} \cos(e^{3x}) dx$.

77) _____

A) $3(\sin(e^6) - \sin(1))$

B) $\sin(e^6) - \sin(1)$

C) $\frac{\sin(e^6) - \sin(1)}{3}$

D) $\frac{\cos(e^6) - \cos(1)}{3}$

78) Use separation of variables to solve the initial value problem.

78) _____

$\frac{dy}{dx} = x - 2 + xy - 2y; \quad y(0) = 6$

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

B) $y = 7e^{x^2} - 2x - 1$

C) $y = 6e^{(x^2/2)} - 2x - 1$

D) $y = 7e^{(x^2/2)} - 2x - 1$

79) To evaluate the following integral, use a u -substitution and integrate from $u(0)$ to $u(\frac{\pi}{6})$:

79) _____

$\int_0^{\pi/6} \sin^2 x \cos x dx$

A) $\frac{1}{24}$

B) $-\frac{7}{24}$

C) $\frac{7}{24}$

D) $-\frac{1}{24}$

80) Use separation of variables to solve the initial value problem.

80) _____

$\frac{dy}{dx} = \frac{\cos x}{3y^2}; \quad y(3) = 5$

81) Which u -substitution would be useful in evaluating

81) _____

$\int \sec^2(9x - 6) dx$? Explain.

A) $u = \tan x$

B) $u = \sec x$

C) $u = 9x - 6$

D) $u = \sec^2 x$

E) $u = \cos(9x - 6)$

Do Not Use Calculator

82) Evaluate the integral $\int_0^{\pi/2} x^2 \cos 2x dx$ using integration by parts.

82) _____

83) Evaluate the integral $\int_0^{\pi} e^x \sin 2x \, dx$. 83) _____

84) Evaluate the integral $\int_1^5 x^4 \ln x \, dx$. 84) _____

- A) $625 \ln 5 + \frac{3125}{16}$ B) $625 \ln 5 - \frac{3124}{25}$ C) $\frac{3125}{4} \ln 5 - \frac{781}{5}$ D) $625 \ln 5 - \frac{1562}{15}$

85) To apply integration by parts to $\int 8x^9 e^{x^4} \, dx$, use $u =$ _____ and $dv =$ _____. 85) _____

- A) $u = 2x^6$; $dv = 4x^3 e^{x^4} \, dx$ B) $u = 2x^5$; $dv = 4x^4 e^{x^4} \, dx$
C) $u = 4x^3 e^{x^4}$; $dv = 2x^6 \, dx$ D) $u = 2x^4$; $dv = 4x^5 e^{x^4} \, dx$

Answer Key

Testname: 19 1ST SEMESTER EXAM REVIEW.TST

1) Answer: D

2) Answer: C

3) Answer: (a) 2

(b) -1

(c) Does not exist, because the left- and right-hand limits are different.

(d) -1

4) Answer: $7 - x^2 \leq 7 - x^2 \sin \frac{1}{x} \leq 7 + x^2$.

$$\lim_{x \rightarrow 0} (7 - x^2) = \lim_{x \rightarrow 0} (7 + x^2) = 7.$$

$$\text{So, } \lim_{x \rightarrow 0} (7 - x^2 \sin \frac{1}{x}) = 7.$$

5) Answer: C

6) Answer: C

7) Answer: C

8) Answer: Removable discontinuity at $x = -2$;
jump discontinuity at $x = 1$;
infinite discontinuity at $x = 3$.

9) Answer: D

10) Answer: D

11) Answer: D

12) Answer: $y = 16x - 16$

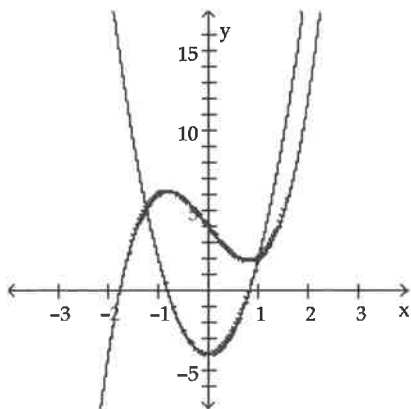
13) Answer: $y = -\frac{1}{8}x + 8\frac{1}{4}$

14) Answer: C

15) Answer: 7

16) Answer: $f'(4) = \lim_{h \rightarrow 0} \frac{[(4+h)^2 - 3(4+h) + 21] - (4^2 - 3(4) + 21)}{h}$
= 5

17) Answer: $f'(x) = \lim_{x \rightarrow 3} \frac{(2/x) - (2/3)}{x - 3} = -\frac{2}{9}$



18) Answer:

19) Answer: B

Answer Key

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20) Answer: A

21) Answer: (d) The graph of the constant function $f(x) = -26$ is a horizontal line through the point $(0, -26)$. Since the slope of any horizontal line is 0, the derivative is also 0.

22) Answer: A

23) Answer: D

24) Answer: $y'' = \frac{100}{x^6}$

25) Answer: $y = -x + \frac{\pi}{2} - 2$

26) Answer: $y' = \cos x + \sec x \tan x$

27) Answer: $y' = \frac{6 \cos x}{(6 + \sin x)^2}$

28) Answer: A

29) Answer: D

30) Answer: C

31) Answer: $f'(x) = 4x \sin(2x^2 + 12)$

32) Answer: $\frac{dy}{dt} = \frac{15t + 21}{\sqrt{15t^2 + 42t - 9}}$

33) Answer: $\frac{dy}{dx} = \frac{8y - 7x^6}{4y^3 - 8x}$

34) Answer: $\frac{dy}{dx} = \frac{10x^4 - 5y \sin(xy)}{5x \sin(xy)}$

35) Answer: B

36) Answer: $\frac{dy}{dx} = \frac{5}{1 + x^2}$

37) Answer: C

38) Answer: A

39) Answer: D

40) Answer: $\frac{dy}{dx} = 4x^8(8 + 9 \ln(9x^8))$

41) Answer: D

42) Answer: C

43) Answer: neither

44) Answer: B

45) Answer: C

46) Answer: decreasing

47) Answer: (a) $(-\infty, -\sqrt{2}), (\sqrt{2}, \infty)$

(b) $(-\sqrt{2}, \sqrt{2})$

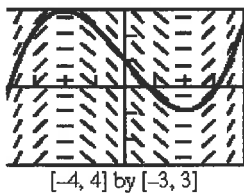
(c) $(-\sqrt{2}, -12)$ and $(\sqrt{2}, -12)$

Answer Key

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- 48) Answer: (a) none
 (b) [2, 3]
 (c) maximum at $(2, e^{-4})$; minimum at $(3, e^{-6})$
- 49) Answer: D
- 50) Answer: A
- 51) Answer: A
- 52) Answer: (b) The function is increasing when the derivative is greater than zero.
- 53) Answer: (a) about 6.779 – by 24.443 – by 30.443 –in.
 (b) about 5044.006 in³
- 54) Answer: D
- 55) Answer: (a) $L(x) = -28x - 47$
 (b) $f(-3.002) \approx 37.056$
- 56) Answer: D
- 57) Answer: (a) $dy = \frac{6}{6x+7} dx$
 (b) $dy \approx 0.004$
- 58) Answer: A
- 59) Answer: C
- 60) Answer: $\int_7^{16} 50 dt = 9$ miles per hour
- 61) Answer: A
- 62) Answer: (c) There is no product rule for integrals.
- 63) Answer: A
- 64) Answer: 423.75
- 65) Answer: $e - 1$
- 66) Answer: D
- 67) Answer: A
- 68) Answer: area = $\frac{22}{3}$
- 69) Answer: C
- 70) Answer: $\approx \frac{241}{4}$
- 71) Answer: $y = \frac{3}{2}x^4 - 10x - 331$

72) Answer:



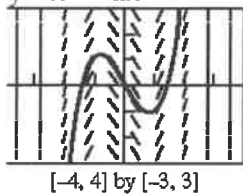
73) Answer: $-\frac{1}{3}x^{-3} - \frac{4}{5}x^{10} + C$

Answer Key

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74) Answer: B

75) Answer: $y = x^3 - 2x$



76) Answer: $15e^{t/15} - \frac{11}{2t^2} + C$

77) Answer: C

78) Answer: D

79) Answer: A

80) Answer: $y = (\sin x + 125)^{1/3}$

81) Answer: C) The integral of $\sec^2 u$ is $\tan u + C$ and the derivative of $u = 9x - 6$ is $du = 9dx$.

82) Answer: $-\frac{\pi}{4}$

83) Answer: $\frac{-2e^{\pi} + 2}{5}$

84) Answer: B

85) Answer: A