

Find the limit, if it exists.

1) $\lim_{x \rightarrow 1} \frac{x^4 - 1}{x - 1}$ 1) _____
 A) 2 B) Does not exist C) 0 D) 4

Find the limit.

2) $\lim_{x \rightarrow 0} \sqrt{15 + \cos^2 x}$ 2) _____
 A) 15 B) 16 C) 4 D) $\sqrt{15}$

Determine the limit by sketching an appropriate graph.

3) $\lim_{x \rightarrow 6^-} f(x)$, where $f(x) = \begin{cases} -2x + 1 & \text{for } x < 6 \\ 3x + 2 & \text{for } x \geq 6 \end{cases}$ 3) _____
 A) 20 B) 2 C) 3 D) -11

Find the limit.

4) $\lim_{x \rightarrow 1^+} \frac{\sqrt{3x}(x-1)}{|x-1|}$ 4) _____
 A) $-\sqrt{3}$ B) 0 C) Does not exist D) $\sqrt{3}$

Find the limit using $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$.

5) $\lim_{x \rightarrow 0} \frac{\tan 4x}{x}$ 5) _____
 A) $\frac{1}{4}$ B) does not exist C) 4 D) 1

Find the limit.

6) $\lim_{x \rightarrow \infty} \sqrt{\frac{4x^2}{3 + 49x^2}}$ 6) _____
 A) does not exist B) $\frac{4}{3}$ C) $\frac{2}{7}$ D) $\frac{4}{49}$

7) $\lim_{x \rightarrow 8^-} \frac{1}{x - 8}$ 7) _____
 A) ∞ B) $-\infty$ C) 0 D) -1

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

8) $h(x) = t^3 - 9t - 2$, (3, -2) 8) _____
 A) $y = -2$ B) $y = 18t - 56$ C) $y = 18t - 2$ D) $y = 16t - 56$

Find the indicated derivative.

- 9) $\frac{dt}{dx}$ if $t = \frac{x}{7x-9}$ 9) _____
- A) $\frac{14x-9}{(7x-9)^2}$ B) $-\frac{9}{7x-9}$ C) $-\frac{9x}{(7x-9)^2}$ D) $-\frac{9}{(7x-9)^2}$

Differentiate the function and find the slope of the tangent line at the given value of the independent variable.

- 10) $s = -5t^4 - 2t^3$, $t = -1$ 10) _____
- A) -14 B) 14 C) 26 D) -26

Find the second derivative.

- 11) $y = 8x^3 - 7x^2 + 3$ 11) _____
- A) $14x - 48$ B) $48x - 14$ C) $32x - 14$ D) $14x - 32$

Find y' .

- 12) $y = (2x^3 + 4)(2x^7 - 5)$ 12) _____
- A) $40x^9 + 56x^6 - 30x^2$ B) $8x^9 + 56x^6 - 30x^2$
- C) $8x^9 + 56x^6 - 30x$ D) $40x^9 + 56x^6 - 30x$

Find the derivative.

- 13) $y = 7x^2e^{-x}$ 13) _____
- A) $7xe^{-x}(x+2)$ B) $14xe^{-x}(1-x)$ C) $7xe^{-x}(2-x)$ D) $7xe^x(2-x)$

- 14) $y = \frac{x^3}{x-1}$ 14) _____

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

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

- 15) $s = -t^3 + 7t^2 - 7t$, $0 \leq t \leq 7$ 15) _____
- Find the body's speed and acceleration at the end of the time interval.
- A) -56 m/sec, -28 m/sec² B) 56 m/sec, -28 m/sec²
- C) 7 m/sec, 0 m/sec² D) 56 m/sec, -7 m/sec²

Find the derivative.

- 16) $s = t^4 \tan t - \sqrt{t}$ 16) _____
- A) $\frac{ds}{dt} = t^4 \sec^2 t + 4t^3 \tan t - \frac{1}{2\sqrt{t}}$ B) $\frac{ds}{dt} = -t^4 \sec^2 t + 4t^3 \tan t + \frac{1}{2\sqrt{t}}$
- C) $\frac{ds}{dt} = 4t^3 \sec^2 t - \frac{1}{2\sqrt{t}}$ D) $\frac{ds}{dt} = t^4 \sec t \tan t + 4t^3 \tan t - \frac{1}{2\sqrt{t}}$

17) $s = t^6 \cos t - 6t \sin t - 6 \cos t$

17) _____

A) $\frac{ds}{dt} = -t^6 \sin t + 6t^5 \cos t - 6t \cos t$

B) $\frac{ds}{dt} = -t^6 \sin t + 6t^5 \cos t - 6t \cos t - 12 \sin t$

C) $\frac{ds}{dt} = -6t^5 \sin t - 6 \cos t + 6 \sin t$

D) $\frac{ds}{dt} = t^6 \sin t - 6t^5 \cos t + 6t \cos t$

Find dy/dt .

18) $y = \cos^7(\pi t - 20)$

18) _____

A) $-7\pi \cos^6(\pi t - 20) \sin(\pi t - 20)$

B) $-7\pi \sin^6(\pi t - 20)$

C) $7 \cos^6(\pi t - 20)$

D) $-7 \cos^6(\pi t - 20) \sin(\pi t - 20)$

Use implicit differentiation to find dy/dx .

19) $2xy - y^2 = 1$

19) _____

A) $\frac{x}{x-y}$

B) $\frac{x}{y-x}$

C) $\frac{y}{x-y}$

D) $\frac{y}{y-x}$

Find the derivative of y with respect to x

20) $y = \ln 7x^2$

20) _____

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

B) $\frac{2x}{x^2+7}$

C) $\frac{14}{x}$

D) $\frac{1}{2x+7}$

Use logarithmic differentiation to find the derivative

21) $y = \sqrt{\frac{x}{x+5}}$

21) _____

A) $\left(\frac{1}{2}\right)\left(\frac{1}{x} - \frac{1}{x+5}\right)$

B) $\frac{5}{2}\sqrt{\frac{x}{x+5}}$

C) $\left(\frac{1}{2}\right)\sqrt{\frac{x}{x+5}}\left(\frac{1}{x} - \frac{1}{x+5}\right)$

D) $\left(\frac{1}{2}\right)(\ln x - \ln(x+5))$

Find the derivative of y with respect to x

22) $y = e^9 - 3x$

22) _____

A) e^{-3}

B) $-3 \ln(9 - 3x)$

C) $9e^9 - 3x$

D) $-3e^9 - 3x$

23) $y = 2xe^x - 2e^x$

23) _____

A) $2xe^x$

B) $2e^x$

C) $2x$

D) $2xe^x + 4e^x$

Find the derivative of y with respect to x .

24) $y = -\cos^{-1}\left(\frac{8x+7}{7}\right)$ 24) _____

A) $-\frac{8}{\sqrt{49 - (8x+7)^2}}$

B) $\frac{8}{1 + (8x+7)^2}$

C) $\frac{56}{\sqrt{1 + (8x+7)^2}}$

D) $\frac{8}{\sqrt{49 - (8x+7)^2}}$

25) $y = \tan^{-1}\sqrt{7x}$ 25) _____

A) $\frac{7}{2(1+7x)\sqrt{7x}}$

B) $\frac{1}{14\sqrt{7x}(1+7x)}$

C) $\frac{1}{\sqrt{1-7x}}$

D) $\frac{1}{1+7x}$

Provide an appropriate response.

26) If $xy + x = 12$ and $dx/dt = -3$, then what is dy/dt when $x = 2$ and $y = 5$? 26) _____

A) -3

B) -9

C) 3

D) 9

Find the linearization $L(x)$ of $f(x)$ at $x = a$. **Hint:** $L(x) = f(a) + f'(a)(x-a)$

27) $f(x) = 5x^2 - 4x + 3, a = -3$ 27) _____

A) $L(x) = -26x + 48$

B) $L(x) = -34x + 48$

C) $L(x) = -26x - 42$

D) $L(x) = -34x - 42$

Find the absolute extreme values of the function on the interval.

28) $f(x) = e^x - x, -3 \leq x \leq 2$ 28) _____

A) Minimum value is 1 at $x = 0$; maximum value is $e^2 - 2$ at $x = 2$

B) Minimum value is 1 at $x = 0$; maximum value is $e^{-3} + 3$ at $x = -3$

C) Minimum value is 1 at $x = 0$; no maximum value

D) Minimum value is $e^{-3} + 3$ at $x = -3$; maximum value is $e^2 - 2$ at $x = 2$

Find the value or values of c that satisfy the equation $\frac{f(b) - f(a)}{b - a} = f'(c)$ in the conclusion of

the Mean Value Theorem for the function and interval.

29) $f(x) = x^2 + 3x + 1, [-3, 2]$ 29) _____

A) -3, 2

B) $-\frac{1}{2}, \frac{1}{2}$

C) $0, -\frac{1}{2}$

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

Determine where the given function is concave up and where it is concave down. Also find all inflection points.

30) $q(x) = 3x^3 + 2x + 8$ 30) _____

A) Concave up for all x ; no inflection points

B) Concave down for all x ; no inflection points

C) Concave up on $(0, \infty)$, concave down on $(-\infty, 0)$; inflection point $(0, 8)$

D) Concave up on $(-\infty, 0)$, concave down on $(0, \infty)$; inflection point $(0, 8)$

Find the most general antiderivative.

31) $\int \left(2t^2 + \frac{t}{3} \right) dt$ 31) _____

A) $6t^3 + \frac{2}{3}t^2 + C$

B) $\frac{2}{3}t^3 + t + C$

C) $\frac{2}{3}t^3 + \frac{t^2}{6} + C$

D) $4t + \frac{1}{3} + C$

32) $\int (5e^{2x} - 4e^{-x}) dx$ 32) _____

A) $\frac{2}{5}e^{2x} + 4e^{-x} + C$ B) $\frac{5}{2}e^{2x} - 4e^{-x} + C$

C) $\frac{5}{2}e^{2x} + \frac{1}{4}e^{-x} + C$ D) $\frac{5}{2}e^{2x} + 4e^{-x} + C$

33) $\int \left(\frac{4}{\sqrt{1-x^2}} - \frac{9}{x} \right) dx$ 33) _____

A) $4 \sin^{-1} x + 9 \ln |x| + C$ B) $4 \sin^{-1} x - \ln |x| + C$

C) $\frac{\sin^{-1} x}{4} - \frac{\ln |x|}{9} + C$ D) $4 \sin^{-1} x - 9 \ln |x| + C$

Find the derivative.

34) $\frac{d}{dx} \int_0^{x^5} \sin t dt$ 34) _____

A) $\sin(x^5)$ B) $-\cos(x^5) - 1$ C) $\frac{1}{6}x^6 \sin(x^5)$ D) $5x^4 \sin(x^5)$

35) $y = \int_0^x \frac{dt}{5t+3}$ 35) _____

A) $\frac{1}{5x+3} - \frac{1}{3}$ B) $\frac{-5}{(5x+3)^2} + \frac{5}{9}$ C) $\frac{1}{5x+3}$ D) $\frac{-5}{(5x+3)^2}$

Find the total area of the region between the curve and the x-axis.

36) $y = 2x - x^2; 0 \leq x \leq 2$ 36) _____

A) $\frac{2}{3}$ B) $\frac{7}{3}$ C) $\frac{5}{3}$ D) $\frac{4}{3}$

Evaluate the integral using an appropriate substitution.

37) $\int \frac{x dx}{(7x^2 + 3)^5}$ 37) _____

A) $-\frac{1}{56}(7x^2 + 3)^{-4} + C$ B) $-\frac{7}{3}(7x^2 + 3)^{-6} + C$

C) $-\frac{7}{3}(7x^2 + 3)^{-4} + C$ D) $-\frac{1}{14}(7x^2 + 3)^{-6} + C$

38) $\int x^2 \sqrt{x^3 + 9} dx$ 38) _____

A) $-\frac{2}{3}(x^3 + 9)^{-1/2} + C$ B) $\frac{2}{3}(x^3 + 9)^{3/2} + C$

C) $\frac{2}{9}(x^3 + 9)^{3/2} + C$ D) $2(x^3 + 9)^{3/2} + C$

Evaluate the integral.

39) $\int \frac{8 \, dx}{4 + 5x}$ 39) _____

A) $-8 \ln|-4 - 5x| + C$

B) $\frac{4}{5} \ln|4 + 5x| + C$

C) $\ln|-4 - 5x| + C$

D) $\frac{8}{5} \ln|4 + 5x| + C$

40) $\int_0^{25} 5\sqrt{x} \, dx$ 40) _____

A) $\frac{1875}{2}$

B) 625

C) $\frac{125}{2}$

D) $\frac{1250}{3}$

41) $\int_0^{\pi/2} 13 \sin x \, dx$ 41) _____

A) 13

B) 0

C) -13

D) 1

Evaluate the definite integral using an appropriate substitution.

42) $\int_0^1 x(x^2 + 1)^5 \, dx$ 42) _____

A) 63

B) $\frac{21}{2}$

C) $\frac{21}{4}$

D) $\frac{31}{12}$

43) $\int_0^1 x^5(7 - x^6)^4 \, dx$ 43) _____

A) $\frac{9031}{30}$

B) $\frac{24583}{30}$

C) $-\frac{9031}{30}$

D) $\frac{9031}{5}$

44) $\int_{-1}^0 (2x^2 + 6x + 2)^2(2x + 3) \, dx$ 44) _____

A) 16

B) $\frac{16}{3}$

C) 0

D) $\frac{8}{3}$

45) $\int_0^2 \frac{1}{(2+x)^2} \, dx$ 45) _____

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

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

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

D) $\frac{1}{4}$

Answer Key

Testname: FINAL_REVIEW

- 1) D
- 2) C
- 3) D
- 4) D
- 5) C
- 6) C
- 7) B
- 8) B
- 9) D
- 10) B
- 11) B
- 12) A
- 13) C
- 14) D
- 15) B
- 16) A
- 17) A
- 18) A
- 19) D
- 20) A
- 21) C
- 22) D
- 23) A
- 24) D
- 25) A
- 26) D
- 27) D
- 28) A
- 29) D
- 30) C
- 31) C
- 32) D
- 33) D
- 34) D
- 35) C
- 36) D
- 37) A
- 38) C
- 39) D
- 40) D
- 41) A
- 42) C
- 43) A
- 44) D
- 45) D