

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

Find the related rate.

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

A) -9

B) -3

C) 9

D) 3

Find the limit.

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

A) ∞

B) $-\infty$

C) Does not exist

D) 2

3) $\lim_{x \rightarrow (\pi/2)^+} \tan(x)$

A) $-\infty$

B) ∞

C) 1

D) 0

Use the substitution formula to evaluate the integral.

4) $\int_0^{5\pi/4} \tan \frac{x}{5} dx$

A) $\frac{-5\sqrt{2}}{2}$

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

C) $\frac{-5 \ln 2}{2}$

D) $\frac{5 \ln 2}{2}$

5) $\int_0^1 \frac{10r dr}{\sqrt{9+5r^2}}$

A) $\sqrt{14} - 3$

B) $-2\sqrt{14} + 6$

C) $\frac{\sqrt{14}}{2} - \frac{3}{2}$

D) $2\sqrt{14} - 6$

Given $y = f(u)$ and $u = g(x)$, find $dy/dx = f'(g(x))g'(x)$.

6) $y = \sin u$, $u = 6x + 15$

A) $-6 \cos(6x + 15)$

B) $6 \cos(6x + 15)$

C) $-\cos(6x + 15)$

D) $\cos(6x + 15)$

Find the limit.

7) $\lim_{x \rightarrow 0} \frac{\sin x}{3x}$

A) 3

B) 1

C) $1/3$

D) Does not exist

Find the extreme values of the function and where they occur.

8) $y = x^3 - 3x^2 + 1$

- A) Local minimum at (2, -3).
- B) Local maximum at (0, 1), local minimum at (2, -3).
- C) Local maximum at (0, 1).
- D) None

Find the derivative of y with respect to x.

9) $y = \tan^{-1} \frac{8x}{5}$

A) $\frac{25}{64x^2 + 25}$

B) $\frac{-40}{64x^2 + 25}$

C) $\frac{40}{64x^2 + 25}$

D) $\frac{8}{\sqrt{25 - 64x^2}}$

Find the derivative.

10) $y = 2x^2 + 11x + 2x^{-3}$

A) $4x + 11 - 6x^{-4}$

B) $4x + 11 + 6x^{-4}$

C) $4x - 6x^{-4}$

D) $2x + 2x^{-4}$

11) $s = t^5 - \csc t + 11$

A) $\frac{ds}{dt} = 5t^4 + \csc t \cot t$

B) $\frac{ds}{dt} = 5t^4 - \csc t \cot t$

C) $\frac{ds}{dt} = 5t^4 + \cot^2 t$

D) $\frac{ds}{dt} = t^4 - \cot^2 t + 11$

Find the limit, if it exists.

12) $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - 5x + 6}$

A) 0

B) 6

C) Does not exist

D) 3

For the epsilon-delta definition of a limit, find the limit L.

13) $\lim_{x \rightarrow 2} (3x - 2)$

A) 4

B) 3

C) Does not exist

D) 0

Find the derivative of the function.

14) $y = \frac{x^2 + 8x + 3}{\sqrt{x}}$

A) $y' = \frac{3x^2 + 8x - 3}{x}$

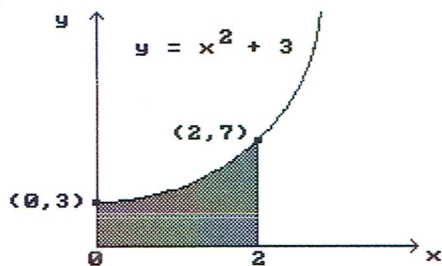
B) $y' = \frac{2x + 8}{2x^{3/2}}$

C) $y' = \frac{3x^2 + 8x - 3}{2x^{3/2}}$

D) $y' = \frac{2x + 8}{x}$

Find the area of the shaded region.

15)



A) $\frac{25}{3}$

B) $\frac{23}{3}$

C) $\frac{26}{3}$

D) $\frac{22}{3}$

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.

16) $f(x) = x^2 + 5x + 2$, $[1, 2]$

A) 1, 2

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

C) $0, \frac{3}{2}$

D) $-\frac{3}{2}, \frac{3}{2}$

Find the slope of the curve at the indicated point.

17) $y = x^2 - 8x - 5$, $x = 1$

A) $m = -7$

B) $m = -11$

C) $m = 2$

D) $m = -6$

Evaluate the integral.

18) $\int \frac{\cos x \, dx}{1 + 8 \sin x}$

A) $8 \ln |1 + 8 \sin x| + C$

B) $\frac{1}{8} \ln |1 + 8 \sin x| + C$

C) $8 \sin x + C$

D) $\ln |1 + 8 \sin x| + C$

19) $\int \frac{7 \, dx}{\sqrt{16 - 49x^2}}$

A) $\frac{1}{4} \tan^{-1} \left(\frac{7}{4}x \right) + C$

B) $\sin^{-1} \left(\frac{7}{4}x \right) + C$

C) $\tan^{-1} \left(\frac{7}{4}x \right) + C$

D) $\frac{1}{4} \sin^{-1} \left(\frac{7}{4}x \right) + C$

Determine all critical points for the function.

20) $f(x) = 20x^3 - 3x^5$

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

B) $x = -2$ and $x = 2$

C) $x = 2$

D) $x = -2$

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

21) $f(x) = -2x + 4$ on $[-4, 2]$

A) 12

B) 36

C) 2

D) 6

Use implicit differentiation to find dy/dx .

22) $x^3 + 3x^2y + y^3 = 8$

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

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

C) $\frac{x^2 + 3xy}{x^2 + y^2}$

D) $-\frac{x^2 + 3xy}{x^2 + y^2}$

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

23) $g(x) = 10 - 6x^2$, $-2 \leq x \leq 4$

A) absolute maximum is 10 at $x = 0$; absolute minimum is -86 at $x = 4$

B) absolute maximum is 60 at $x = 0$; absolute minimum is -14 at $x = -2$

C) absolute maximum is 6 at $x = 0$; absolute minimum is -106 at $x = 4$

D) absolute maximum is 20 at $x = 0$; absolute minimum is -14 at $x = 4$

Using the derivative of $f(x)$ given below, determine the intervals on which $f(x)$ is increasing or decreasing.

24) $f'(x) = (8 - x)(9 - x)$

A) Decreasing on $(-\infty, -8) \cup (-9, \infty)$; increasing on $(-8, -9)$

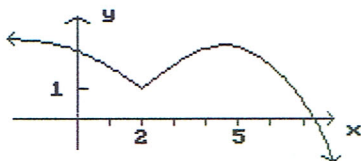
B) Decreasing on $(-\infty, 8)$; increasing on $(9, \infty)$

C) Decreasing on $(-\infty, 8) \cup (9, \infty)$; increasing on $(8, 9)$

D) Decreasing on $(8, 9)$; increasing on $(-\infty, 8) \cup (9, \infty)$

Given the graph of f , find any values of x at which f' is not defined.

25)



A) $x = 5$

C) $x = 2, 5$

B) $x = 2$

D) Defined for all values of x

Find the second derivative.

26) $w = z^{-5} - \frac{1}{z}$

A) $30z^{-7} + \frac{2}{z^3}$

B) $30z^{-7} - \frac{2}{z^3}$

C) $-5z^{-6} + \frac{1}{z^2}$

D) $-5z^{-7} - \frac{2}{z^3}$

Find the derivative of y with respect to x .

27) $y = \ln 4x^2$

A) $\frac{1}{2x + 4}$

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

C) $\frac{2x}{x^2 + 4}$

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

Find y' .

28) $y = (5x - 5)(6x + 1)$

A) $60x - 25$

B) $60x - 35$

C) $30x - 25$

D) $60x - 12.5$

Find the function with the given derivative whose graph passes through the point P.

29) $f'(x) = x - 9$, $P(2, -10)$

A) $f(x) = x^2 - 9x$

B) $f(x) = \frac{x^2}{2} - 9x + 6$

C) $f(x) = x^2 - 9x + 4$

D) $f(x) = \frac{x^2}{2} - 9x + 7$

Evaluate the integral using the given substitution.

30) $\int x^4(x^5 - 2)^3 dx$, $u = x^5 - 2$

A) $\frac{1}{10}(x^5 - 2)^2 + C$

B) $\frac{1}{20}x^{20} - 2 + C$

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

D) $\frac{1}{20}(x^5 - 2)^4 + C$

Solve the problem.

31) Find an equation of the tangent to the curve $f(x) = 2x^2 - 2x + 1$ that has slope 2.

A) $y = 2x + 2$

B) $y = 2x$

C) $y = 2x - 1$

D) $y = 2x + 1$

Find the derivative of y with respect to x .

32) $y = 5xe^x - 5e^x$

A) $5e^x$

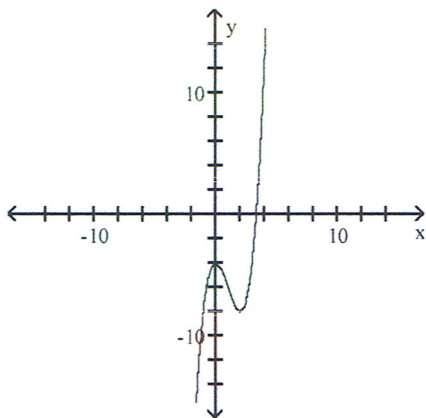
B) $5xe^x + 10e^x$

C) $5x$

D) $5xe^x$

Use the graph of the function $f(x)$ to locate the local extrema and identify the intervals where the function is concave up and concave down.

33)



A) Local minimum at $x = 2$; local maximum at $x = 0$; concave up on $(0, \infty)$; concave down on $(-\infty, 0)$

B) Local minimum at $x = 2$; local maximum at $x = 0$; concave down on $(0, \infty)$; concave up on $(-\infty, 0)$

C) Local minimum at $x = 0$; local maximum at $x = 2$; concave up on $(0, \infty)$; concave down on $(-\infty, 0)$

D) Local minimum at $x = 0$; local maximum at $x = 2$; concave down on $(0, \infty)$; concave up on $(-\infty, 0)$