

Provide an appropriate response.

1) Determine: $\int \frac{3t^3 - 4t^2 - t + 1}{t^2} dt$ 1) _____

2) Determine: $\int 4s^{+1} ds$ 2) _____

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

3) $\int \frac{x^2 + 3x - 4}{x + 2} dx =$ 3

A) $\frac{1}{2} \ln|x + 2| + C$

B) $\frac{x^2}{2} + x - 6 \ln|x + 2| + C$

C) $\frac{\left(\frac{x^3}{3}\right) + \left(\frac{3x^2}{2}\right) - 4x}{\left(\frac{x^2}{2}\right) + 2x} + C$

D) $\frac{1}{3} \ln|x + 2| + C$

E) $\frac{x^2}{2} + 5x + 6 \ln|x + 2| + C$

4) If the marginal cost function is given by $C'(q) = \frac{3}{4} - \frac{1}{2\sqrt{3q}}$, find the cost function if $C(0) = 1000$.

5) The height of a cylinder is decreasing at a rate of $\frac{dh}{dt} = -12t^2e^{t^3}$. Find h as a function of t .

6) A bacteria population is increasing at a rate of $\frac{dp}{dt} = 4t^39t^4$. Find p as a function of t .

7) Determine $\int \frac{7x^6 - 8x^4 + 9x^3}{2x^2} dx$

8) Determine: $\int (3x - 4)^5 dx$

9) Determine: $\int x^2(2x^3 - 5)^4 dx$

10) Determine $\int \sqrt{5x} dx$

11)

Determine: $\int x^2 \sqrt[3]{x^3 + 8} dx$

12) Determine: $\int \frac{x^2 - 2x + 1}{x^3 - 3x^2 + 3x - 4} dx$

13) Determine: $\int \left(\frac{4}{x} - \frac{x}{4} \right) dx$

14) If $y'' = x^2 + e^{x+1}$ and $y'(-1) = 0$ and $y(-1) = -\frac{1}{4}$, find y .

15) $\int e^{3x+4} dx =$

A) $\frac{1}{3}e^{3x+4} + C$

B) $e^{3x+4} + C$

C) $(3x + 4)e^{3x+3} + C$

D) $\frac{e^{3x+5}}{3x+5} + C$

E) $3e^{3x+4} + C$

16) If $\frac{dy}{dx} = 3x^2 - 3 - 4e^{2x}$ and $y(0) = 8$, then $y =$

A) $x^3 - 3x - 2e^{2x} + 8$.

B) $x^3 - 3x - 2e^{2x}$.

C) $x^3 - 3x - 4e^{2x}$.

D) 8.

E) $x^3 - 3x - 2e^{2x} + 10$.

17) $\int \frac{x^2 + 4x - 3}{x - 1} dx =$

A) $\frac{x^2}{2} + 6x + 3 \ln|x - 1| + C$

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

C) $\frac{1}{3} \ln|x - 1| + C$

● D) $\frac{x^2}{2} + 5x + 2 \ln|x - 1| + C$

E) $\frac{1}{2} \ln|x - 1| + C$

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

18) Determine: $\int \frac{\ln(xe^{2x})}{x} dx$

19) The base of a triangle is decreasing at a rate of $\frac{db}{dt} = -\frac{3e^{-\sqrt{t}}}{\sqrt{t}}$. Find b as a function of t .

20) Determine: $\int \frac{2(x^2 + 5)}{3} dx$

21)

Determine: $\int \frac{1}{4\sqrt{x}} dx$

23) $\int x^3 - \frac{1}{x^4} + 2 dx =$

Ⓐ) $\frac{x^4}{4} + \frac{1}{3x^3} + 2x + C$

B) $3x^2 + 4x^{-5} + C$

C) $\frac{x^4}{4} - \frac{1}{3x^3} + 2x + C$

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

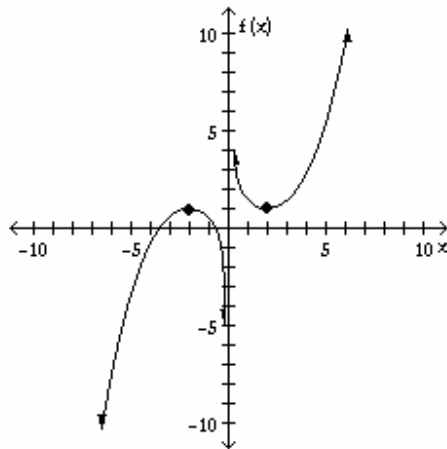
E) $\frac{x^4}{4} - \frac{3}{x^3} + 2x + C$

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

24) Find all the critical values of $f(x) = \frac{x^2 + 9}{x}$.

25) The graph of a function is given. Find

- (a) the open intervals on which the function is increasing or decreasing;
- (b) the coordinates of all relative extrema.



26) The function $f(x) = x^2 - 6x + 8$ is decreasing on

- A) $(-3, 3)$.
- B) $(-\infty, 3)$.
- C) $(2, 4)$.
- D) $(-\infty, 2)$ and $(4, \infty)$.
- E) $(3, \infty)$.

27) The function $y = x^4 - 8x^2$ has a relative maximum when $x =$

- A) 2.
- B) 0.
- C) 1.
- D) -2.
- E) -1.

28) If $y = x^4 + 4x^3 - 18x^2 - 3x + 4$, find the x -values of all inflection points. 28) .

29) If $y = x(x - 1)^3$, find the x -values of all inflection points. 29) .

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

30) The function $y = \frac{x^5}{20} + \frac{x^4}{12} + x - 3$ has how many inflection points?

- A) none
- B) one
- C) two
- D) three
- E) four

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

31) Given $y = f(x) = 2x^3 + 12x^2 - 7$ on the interval $[0, 4]$, find the values of x at which absolute maxima and absolute minima occur. 31) .

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

32) On the interval $[0, 2]$, the function $y = x^3 + 3x^2 - 9x + 27$ has an absolute maximum when $x =$

- A) 0.
- B) 1.
- C) 2.
- D) $\frac{1}{2}$.
- E) none of the above

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

33) Find two numbers whose sum is 50 and such that the product of one of them and five more than the other is a maximum. 33) .

34) The demand equation for a monopolist's product is $p = \frac{10,000}{q^2 + 25}$, where p is the price per 34) .

unit (in dollars) when q units are demanded.

- (a) Determine the value of q for which revenue is maximum.
- (b) What is the maximum revenue?

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unit (in dollars) when q units are demanded.

(a) Determine the value of q for which revenue is maximum.

(b) What is the maximum revenue?

35) The demand function for a monopolist's product is $p = 100 - 3q$, where p is the price per unit (in dollars) for q units. If the average cost \bar{c} (in dollars) per unit for q units is $\bar{c} = 4 + \frac{100}{q}$, find the output q at which profit is maximized.

36) Determine the equations of the vertical asymptotes and non-vertical asymptotes for the graph of $y = \frac{x - 2}{x^2 + 5x}$.

37) Determine the equations of the vertical asymptotes and non-vertical asymptotes for the graph of $y = \frac{x^2 - 4}{4x^2 - 25}$.