

1 Evaluate

$$\lim_{x \rightarrow -3^-} \left(\frac{x^2 + 3}{x + 3} \right).$$

- a. 6
- b. ∞
- c. $-\infty$
- d. undefined

2 Evaluate

$$\lim_{x \rightarrow -\infty} (x^4 + 5x^2).$$

- a. 24
- b. ∞
- c. $-\infty$
- d. undefined

3 Evaluate

$$\lim_{x \rightarrow 6} \left(\frac{x^2 - 36}{x - 6} \right).$$

- a. 12
- b. ∞
- c. $-\infty$
- d. undefined

4 Evaluate

$$\lim_{t \rightarrow 0} \frac{3t \sin t}{\cos(2t) - 1}.$$

- a. $-\frac{3}{2}$
- b. 0
- c. $\frac{3}{2}$
- d. undefined

5 Given

$$f(x) = 3x^2,$$

use the definition of the derivative as a limit to calculate $f'(1)$.

- a. $\lim_{h \rightarrow 0} (6 + 2h) = 6$
- b. $\lim_{h \rightarrow 0} (6 + h) = 6$
- c. $\lim_{h \rightarrow 0} (6 + 3h) = 6$
- d. $\lim_{h \rightarrow 0} (6 + 6h) = 6$

6 Given

$$y = \sqrt{3x^2 + 4},$$

find the derivative of y with respect to x .

- a. $\frac{dy}{dx} = \frac{\sqrt{3x^2 + 4}}{2} = \frac{1}{2}(3x^2 + 4)^{1/2}$
- b. $\frac{dy}{dx} = 3x\sqrt{3x^2 + 4} = 3x(3x^2 + 4)^{1/2}$
- c. $\frac{dy}{dx} = \frac{3x\sqrt{3x^2 + 4}}{3x^2 + 4} = 3x(3x^2 + 4)^{-1/2}$
- d. $\frac{dy}{dx} = \frac{\sqrt{3x^2 + 4}}{2(3x^2 + 4)} = \frac{1}{2}(3x^2 + 4)^{-1/2}$

7 Given

$$3x + 4y = x^2 + y^3,$$

find the differential of y in terms of the differential of x .

- a. $dy = -\frac{(2x - 3) dx}{3y^2 - 4} = -\frac{2x - 3}{3y^2 - 4} dx$
- b. $dy = \frac{(3y^2 + 2x) dx}{7} = \frac{3y^2 + 2x}{7} dx$
- c. $dy = \frac{(3y^2 + 2x - 3) dx}{4} = \frac{3y^2 + 2x - 3}{4} dx$
- d. $dy = -\frac{(2x - 3) dx}{3y - 4} = -\frac{2x - 3}{3y - 4} dx$

8 Given

$$x = te^{2t},$$

find the derivative of x with respect to t .

- a. $2e^{2t}$
- b. $e^{2t} + te^{2t} = (t + 1)e^{2t}$
- c. $2te^{2t}$
- d. $e^{2t} + 2te^{2t} = (2t + 1)e^{2t}$

9 Given

$$p = \arctan(q^2) + \cos(3q) = \tan^{-1}(q^2) + \cos(3q),$$

find the derivative of p with respect to q .

- a. $\frac{2q}{\sqrt{1 - q^4}} - 3 \sin(3q)$
- b. $\frac{2q}{q^4 + 1} - 3 \sin(3q)$
- c. $\frac{2q}{q^4 + 1} + 3 \sin(3q)$
- d. $\frac{2q}{\sqrt{1 - q^4}} + 3 \sin(3q)$

10 Given

$$f(x) = \frac{x+1}{x-4},$$

find f' .

a. $f'(x) = -\frac{5}{(x+1)^2}$

b. $f'(x) = \frac{5}{(x-4)^2}$

c. $f'(x) = -\frac{5}{(x-4)^2}$

d. $f'(x) = \frac{5}{(x+1)^2}$

11 Given

$$g(x) = 4x^3 + 2x^2,$$

find g'' .

a. $g''(x) = 12x^2 + 4x$

b. $g''(x) = 24x + 4$

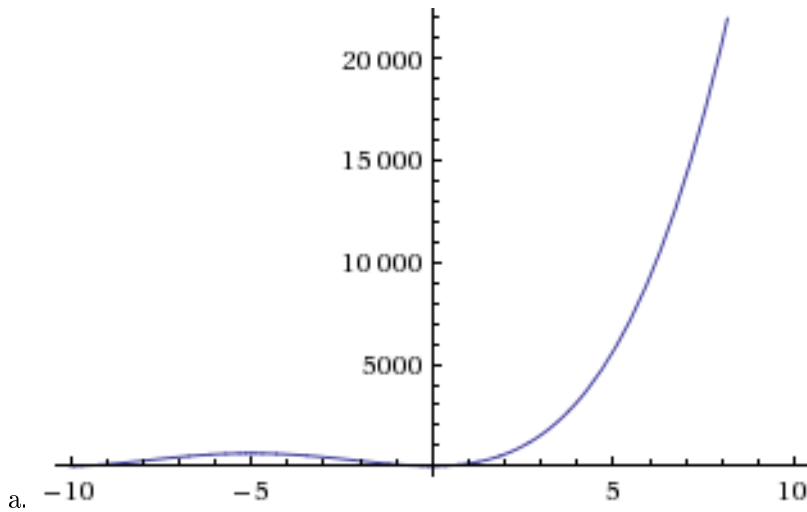
c. $g''(x) = 24x^2 + 4x$

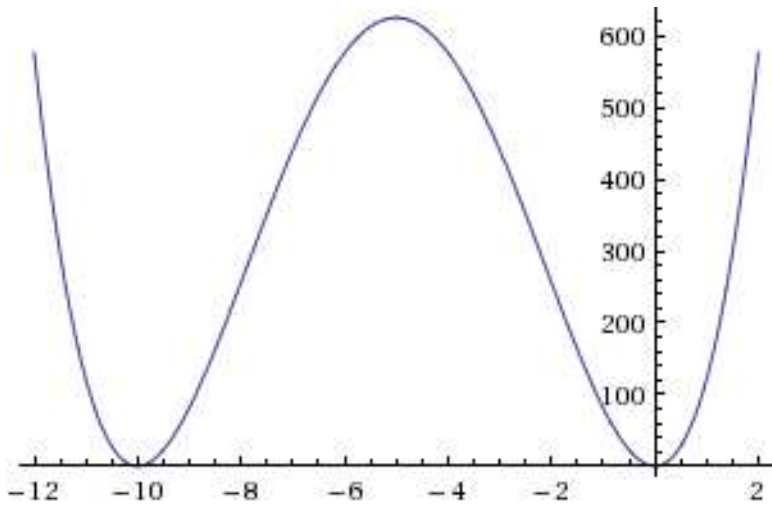
d. $g''(x) = 12x + 4$

12 Given

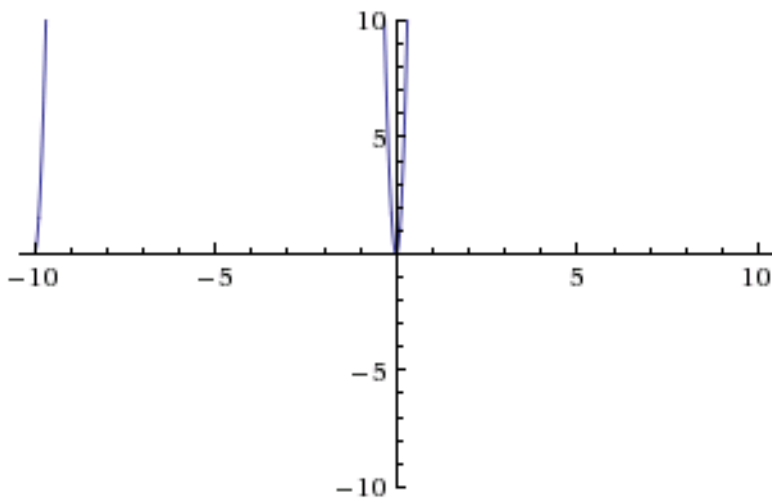
$$f(x) = x^4 + 20x^3 + 100x^2,$$

sketch a graph of f that shows all intercepts (if any), all local extrema (if any), and both infinite limits (if applicable).

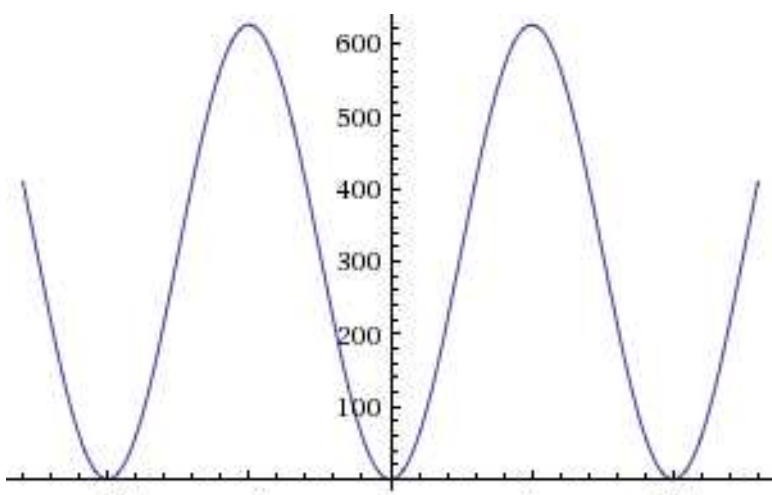




b.



c.



d.

13 Given

$$f(x) = \sqrt{100 - x^3},$$

find the maximum and minimum value of f , if they exist.

- a. maximum is 10, minimum is 0
- b. maximum is 10, no minimum
- c. no maximum, minimum is 0
- d. no maximum, no minimum

14 Find the sum

$$\sum_{i=1}^{200} i.$$

- a. 39,800
- b. 40,200
- c. 20,100
- d. 19,900

15 Find the value of

$$\int_0^1 (4x^3 - 3x^2 + 4x - 2) dx.$$

- a. 4
- b. 2
- c. 0
- d. 3

16 Given

$$f(x) = \frac{1}{x+2} + e^{3x},$$

find the antiderivatives (indefinite integrals) of f .

- a. $\int f(x) dx = \frac{1}{2} \ln(x+2) + \frac{1}{3} e^{3x} + C$
- b. $\int f(x) dx = \ln(x+2) + e^{3x} + C$
- c. $\int f(x) dx = \frac{1}{2} \ln(x+2) + e^{3x} + C$
- d. $\int f(x) dx = \ln(x+2) + \frac{1}{3} e^{3x} + C$

17 Find the value of

$$\int_{-2}^2 x \sqrt{x^2 + 5} dx.$$

- a. $\frac{4}{3} \sqrt{2} \approx 1.9$
- b. 0
- c. $9 - \frac{5}{3} \sqrt{5} \approx 5.3$
- d. $\frac{2}{3} \sqrt{2} \approx 0.9$

18 Set up a definite integral whose value is the area bounded by the graphs of these equations:

$$y = x^2,$$
$$y = 4x.$$

- a. $\int_0^2 (x^2 - 4x) dx$
- b. $\int_0^4 (x^2 - 4x) dx$
- c. $\int_0^2 (4x - x^2) dx$
- d. $\int_0^4 (4x - x^2) dx$

19 Set up an integral whose value is the length of the curve with equation

$$y = \sqrt{3x^2 - x^3}$$

from $(x, y) = (3, 0)$ to $(x, y) = (2, 2)$.

- a. $\int_3^2 \frac{1}{2} \sqrt{\frac{9x^2 - 40x + 48}{3 - x}} dx$
- b. $\int_0^2 \frac{1}{2} \sqrt{\frac{9x^2 - 40x + 48}{3 - x}} dx$
- c. $\int_2^3 \frac{1}{2} \sqrt{\frac{9x^2 - 40x + 48}{3 - x}} dx$
- d. $\int_0^2 \frac{1}{2} \sqrt{\frac{9y^2 - 40y + 48}{3 - y}} dy$

20 Suppose that a leaking oil platform is forming a circular oil slick. At the moment, the radius of this slick is 100 metres, and it's increasing at a rate of 3 metres per hour. How fast is the area of the oil slick increasing?

- a. $900\pi \text{ m}^2/\text{h} \approx 2800 \text{ m}^2/\text{h}$
- b. $30,000\pi \text{ m}^2/\text{h} \approx 94,000 \text{ m}^2/\text{h}$
- c. $300\pi \text{ m}^2/\text{h} \approx 940 \text{ m}^2/\text{h}$
- d. $600\pi \text{ m}^2/\text{h} \approx 1900 \text{ m}^2/\text{h}$

21 Suppose that a ball thrown into the air has its height given by

$$h = 6 + 5t - 16t^2,$$

where h is its height in feet and t is the time in seconds since it was thrown, from the time it is thrown until the time it lands.

- a. How long after it was thrown is it at its maximum height?
- b. What is the ball's maximum height?
- c. What is the ball's minimum height?
- d. At what height was the ball thrown?
- e. At what vertical speed was the ball thrown?
- f. What is the ball's vertical acceleration?

22 Fill in the blank: If

$$\lim_{x \rightarrow c} f(x) = f(c),$$

then f is _____ at c .

23 If

$$\lim_{h \rightarrow 0} \frac{f(c+h) - f(c)}{h}$$

exists, then f is _____ at c .

24 The _____ of y is dy .

25 The _____ of f is f' .

26 The expression $\int_a^b f(x) dx$ is a(n) _____ integral.

Answers

1 C, 2 B, 3 A, 4 A, 5 C, 6 C, 7 A, 8 D, 9 B, 10 C, 11 B, 12 B, 13 C, 14 C, 15 C, 16 D, 17 B, 18 D, 19 C, 20 D.

21 A $5/32$ s, B $409/64$ ft, C 0, D 6 ft, E 5 ft/s, F -16 ft/s².

22 continuous

23 differentiable

24 differential

25 derivative

26 definite