

Name _____

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

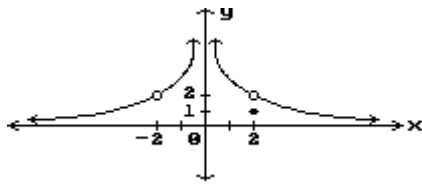
Use the properties of limits to help decide whether the limit exists. If the limit exists, find its value.

1) $\lim_{x \rightarrow -9} \frac{x^2 + 13x + 36}{x + 9}$ 1) _____

- A) 234 B) 13 C) Does not exist D) -5

Find all points where the function is discontinuous.

2) _____



- A) $x = -2, x = 0$ B) $x = 0, x = 2$
 C) $x = -2, x = 0, x = 2$ D) $x = 2$

Find the slope of the line tangent to the graph of the function at the given value of x.

3) $y = x^4 + 8x^3 + 2x + 2; x = 1$ 3) _____

- A) 32 B) 29 C) 27 D) 30

Find the derivative.

4) $f(x) = 2x^4 - 6x^3 + 1$, find $f'(x)$ 4) _____

- A) $8x^3 - 18x^2 - 7$ B) $8x^3 - 18x^2$ C) $4x^3 + 3x^2$ D) $4x^3 + 3x^2 - 7$

5) $y = 4e^{x^2}$ 5) _____

- A) $8xe$ B) $8xe^{x^2}$ C) $8xe^{2x}$ D) $8xe^{4x^2}$

Find the derivative of the function.

6) $y = \ln 5x$ 6) _____

- A) $\frac{1}{5x}$ B) $\frac{1}{x}$ C) $-\frac{1}{x}$ D) $-\frac{1}{5x}$

Use the product rule to find the derivative.

7) $f(x) = (4x - 2)(4x + 1)$ 7) _____

- A) $f'(x) = 32x - 4$ B) $f'(x) = 32x - 12$ C) $f'(x) = 32x - 2$ D) $f'(x) = 16x - 4$

Use the quotient rule to find the derivative.

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

8) _____

A) $f'(x) = -\frac{1}{(7x^7 + 2)^2}$

B) $f'(x) = \frac{7x^6}{(x^7 + 2)^2}$

C) $f'(x) = \frac{1}{(7x^7 + 2)^2}$

D) $f'(x) = -\frac{7x^6}{(x^7 + 2)^2}$

Find the derivative. Use the Chain Rule

9) $y = \sqrt{4x + 2}$

9) _____

A) $\frac{dy}{dx} = \frac{8}{\sqrt{4x + 2}}$

B) $\frac{dy}{dx} = \frac{4}{\sqrt{4x + 2}}$

C) $\frac{dy}{dx} = \frac{2}{\sqrt{4x + 2}}$

D) $\frac{dy}{dx} = \frac{1}{\sqrt{4x + 2}}$

Find the open interval(s) where the function is changing as requested.

10) Increasing; $y = x^4 - 18x^2 + 81$

10) _____

A) $(-\infty, 0)$

B) $(-3, 0)$

C) $(-3, 0), (3, \infty)$

D) $(-3, 3)$

Find the x-value of all points where the function has relative extrema. Find the value(s) of any relative extrema.

11) $f(x) = x^3 - 3x^2 + 1$

11) _____

A) Relative maximum of 1 at 0; Relative minimum of -3 at 2.

B) Relative maximum of 0 at 1; Relative minimum of -3 at -2.

C) No relative extrema.

D) Relative maximum of 1 at 0.

Find $f''(x)$ for the function.

12) $f(x) = 3x^4 - 8x^2 + 4$

12) _____

A) $36x^2 - 16x$

B) $12x^2 - 16$

C) $36x^2 - 16$

D) $12x^2 - 16x$

Find the largest open intervals where the function is concave upward.

13) $f(x) = x^3 - 3x^2 - 4x + 5$

13) _____

A) None

B) $(-\infty, 1), (1, \infty)$

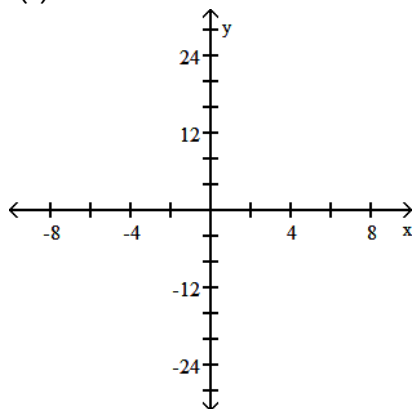
C) $(1, \infty)$

D) $(-\infty, 1)$

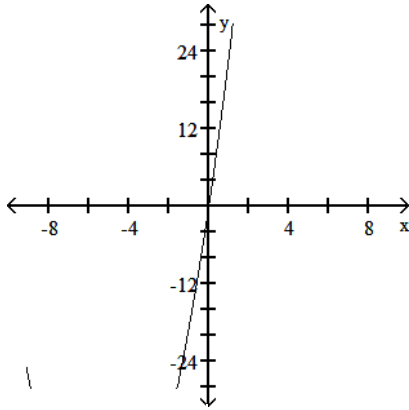
Sketch the graph and show all extrema, inflection points, and asymptotes where applicable.

14) $f(x) = 2x^3 + 12x^2 + 18x$

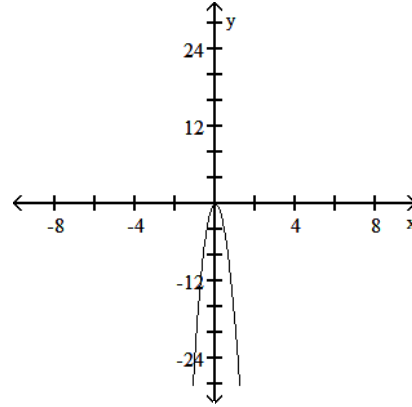
14) _____



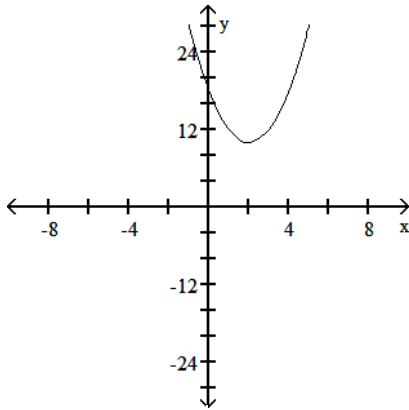
A) No extrema
Inflection point: $(0, 0)$



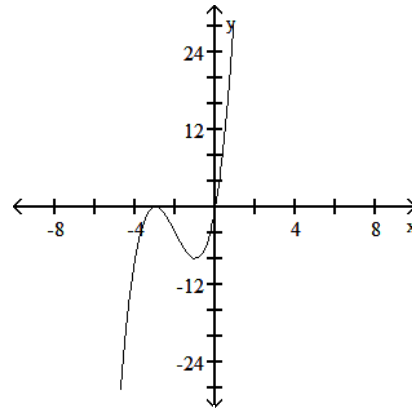
B) Rel: max: $(0, 0)$
Rel min: $(-7, 343)$
Inflection point: $(-3.5, 171.5)$



C) Rel min: $(2, 10)$
No inflection points



D) Rel: max $(-3, 0)$; Rel min: $(-1, -8)$
Inflection point: $(-2, -4)$



Find the integral.

15) $\int (4x^2 - 4x) dx$

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

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

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

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

15) _____

16) $\int (5x^{-3} - 4x^{-1}) dx$

A) $-\frac{5}{2}x^{-2} + 4 \ln|x| + C$

B) $\frac{5}{3}x^{-2} + 4 \ln|x| + C$

C) $\frac{5}{3}x^{-2} - 4 \ln|x| + C$

D) $-\frac{5}{2}x^{-2} - 4 \ln|x| + C$

16) _____

17) $\int (t^6 + e^{3t}) dt$

A) $\frac{t^5}{5} + 3e^{3t} + C$

B) $\frac{t^7}{7} + e^{3t} + C$

C) $\frac{t^7}{7} + \frac{e^{4t}}{4} + C$

D) $\frac{t^7}{7} + \frac{e^{3t}}{3} + C$

17) _____

18) Use Substitution

18) _____

$$\int 3(2t + 5)^3 dt$$

A) $\frac{3}{8}(2t + 5)^4 + C$

B) $\frac{1}{4}(2t + 5)^4 + C$

C) $\frac{3}{4}(2t + 5)^4 + C$

D) $\frac{1}{2}(2t + 5)^4 + C$

19) Use Substitution

19) _____

$$\int 9z \sqrt{3z^2 - 7} dz$$

A) $\frac{1}{2}z(3z^2 - 7)^{3/2} + C$

B) $\frac{1}{2}(3z^2 - 7)^{3/2} + C$

C) $z(3z^2 - 7)^{3/2} + C$

D) $(3z^2 - 7)^{3/2} + C$

Evaluate the definite integral.

20) $\int_0^1 x(x^2 + 1)^5 dx$

20) _____

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

B) 63

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

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

Find the area between the curves.

21) $y = x^3, y = x^2$

21) _____

A) $\frac{1}{12}$

B) $\frac{5}{12}$

C) $\frac{5}{6}$

D) $\frac{1}{6}$