

1. What is $\lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$?

- A. $2xh$
- B. $2x$
- C. h
- D. 0

2. If $f(x) = \sqrt{x+2}$, then which one of the following is equal to $f'(x)$?

- A. $\lim_{h \rightarrow 0} \frac{\sqrt{x+h+2} - \sqrt{x+2}}{2}$
- B. $\lim_{h \rightarrow 0} \frac{\sqrt{x+h+2} - \sqrt{x+2}}{h}$
- C. $\lim_{x \rightarrow 2} \frac{\sqrt{x+2} - \sqrt{h+2}}{h}$
- D. $\lim_{x \rightarrow 2} \frac{\sqrt{x+h+2} - \sqrt{h}}{h}$

3. If $f(x) = x^{2/5}$, then which one of the following is equal to $f'(a)$?

- A. $\lim_{a \rightarrow 0} \frac{(a+h)^{2/5} - a^{2/5}}{h}$
- B. $\lim_{h \rightarrow 0} \frac{(\frac{1}{x})^{5/2} - (\frac{1}{a})^{5/2}}{h}$
- C. $\lim_{h \rightarrow 0} \frac{(x+h)^{2/5} - h^{2/5}}{h}$
- D. $\lim_{x \rightarrow a} x^{2/5}$

4. The functions f and g are differentiable and have the values shown in the table.

If $A = f + g$ then $A'(2) =$

x	f	f'	g	g'
0	5	1	-7	$\frac{1}{4}$
2	8	3	-5	1
4	14	9	-3	4
6	26	27	-1	16

- A. 3
- B. 4
- C. -4
- D. 5

5. The functions f and g have the values shown in the table and are differentiable.

If $A = f \cdot g$ then $A'(0) =$

x	f	f'	g	g'
0	6	1	-8	$\frac{1}{3}$
2	8	3	-5	1
4	14	9	-3	4
6	26	27	-1	16

- A. 0
B. -6
C. $\frac{10}{3}$
D. $\frac{1}{3}$

6. The functions f and g are differentiable and have the values shown in the table.

If $A = \left(\frac{1}{f}\right)$ then $A'(4) =$

x	f	f'	g	g'
0	5	1	-7	$\frac{1}{4}$
2	8	3	-5	1
4	14	9	-3	4
6	26	27	-1	16

- A. 0
B. $\frac{9}{146}$
C. $-\frac{9}{196}$
D. $-\frac{1}{9}$

7. The functions f and g have the values shown in the table and are differentiable.

If $A = \left(\frac{g}{f}\right)$ then $A'(2) =$

x	f	f'	g	g'
0	5	1	-7	$\frac{1}{4}$
2	8	3	-5	1
4	14	9	-3	4
6	26	27	-1	16

- A. 23
- B. $-\frac{23}{64}$
- C. $\frac{23}{64}$
- D. -23

8. The functions f and g are differentiable and have the values shown in the table.

If $A = f(g(x))$ then $A'(-8) =$

x	f	f'	g	g'
-8	4	3	-2	6
-6	10	12	0	9
-2	20	9	6	18
2	30	15	12	24

- A. 18
- B. 54
- C. 9
- D. -9

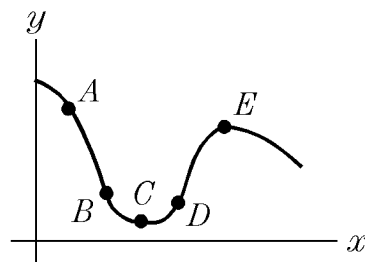
9. f and g are differentiable functions and have the values shown in the table.

If $A = \sqrt{g(x)}$ then $A'(-2) =$

x	f	f'	g	g'
-8	4	3	-2	6
-6	10	12	0	9
-2	16	9	36	18
2	30	15	52	24

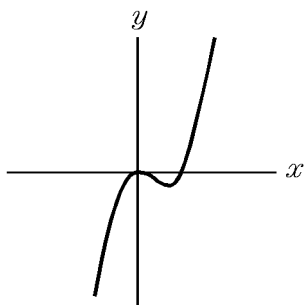
- A. $\frac{9}{8}$
B. $\frac{3}{2}$
C. $\frac{4}{9}$
D. 6

10. At which of the five points shown on the graph is $\frac{dy}{dx}$ positive? Choose the *best* answer.



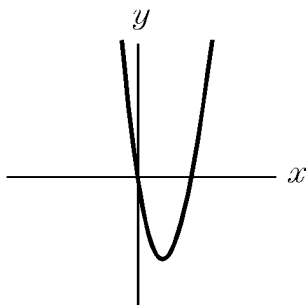
- A. A and E
B. D only
C. C, D, and E
D. E only

11.

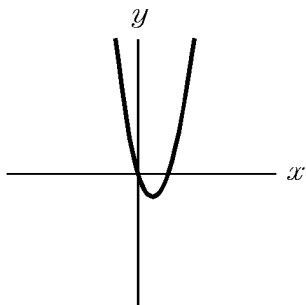


Given the graph of f shown above, which of the following is the graph of the derivative, f' ?

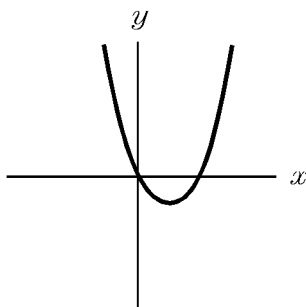
A.



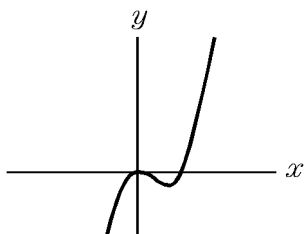
B.



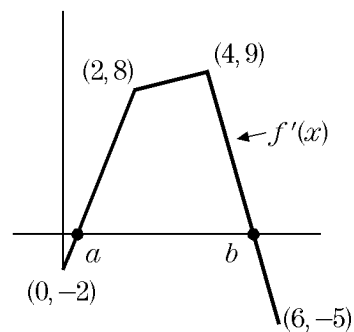
C.



D.



12.



The graph of f' is shown. If $f(2) = 6$, then $f(0) = \underline{\hspace{2cm}}$.

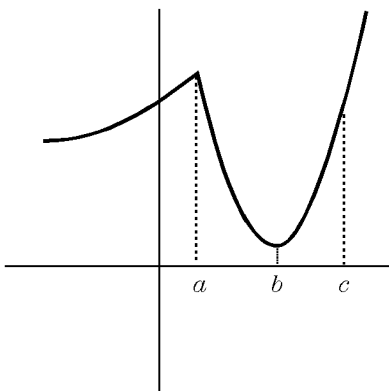
A. -10

B. 2

C. -2

D. -22

13.



Which of the following tables best goes with the graph of f shown?

A.

x	$f'(x)$
a	0
b	0
c	4

B.

x	$f'(x)$
a	0
b	0
c	-2

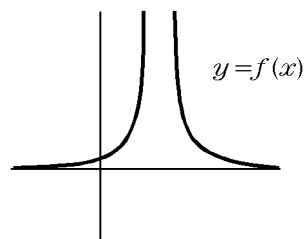
C.

x	$f'(x)$
a	does not exist
b	0
c	6.2

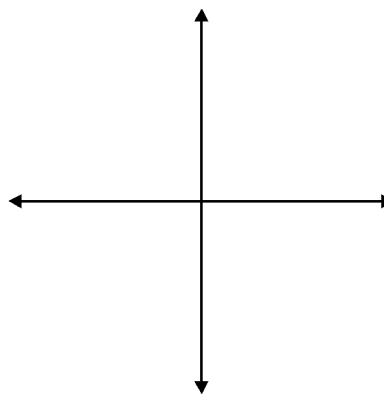
D.

x	$f'(x)$
a	does not exist
b	does not exist
c	-1

14.



Given the graph of $f'(x)$, sketch the graph of $f(x)$



15. If $f(x) = 5x^3$, then $f'(2) =$

A. 30

B. 10

C. 40

D. 60

- 16.** A curve is given by $y = a^3$, where $a = m^2(2m - 1)$. Approximate the slope of the curve when $m = 0.6543$.

A. 0.108
B. 0.143
C. 0.066
D. 0.047

- 17.** Find the derivative, $\frac{dy}{dx}$, of $y = \frac{2x}{1 - 3x^2}$.

A. $-\frac{1}{3x}$
B. $\frac{6x^2 + 2}{(1 - 3x^2)^2}$
C. $\frac{9x^2 - 2}{(1 - 3x)^2}$
D. $\frac{2x}{3(1 - 3x^2)^2}$

- 18.** Given the function $f(c) = \frac{2c^2}{(c^3 + 4)^2}$, find $f'(3.526)$ to three decimal places.

A. -0.011
B. -0.019
C. 0.018
D. 0.020

- 19.** Find the derivative, $\frac{dy}{dx}$, of $f(x) = \frac{x^2 - 1}{x^2 + 1}$.

A. $\frac{4x}{(x^2 + 1)^2}$
B. 1
C. $-\frac{4x}{(x^2 + 1)^2}$
D. $\frac{-4x^2 - 4x}{(x^2 + 1)^2}$

20. If $y = \frac{-5}{\sqrt[3]{x+3}}$, then $\frac{dy}{dx} =$

A. $\frac{5}{3\sqrt[3]{(x+3)^4}}$

B. $\frac{8}{\sqrt{(x+3)^5}}$

C. $\frac{-1}{\sqrt{(x+3)^4}}$

D. $\frac{-1}{5(x+3)^{4/3}}$

21. If $f(x) = (2x^3 + 5x^2 - 7x + 4)(4x^2 - 5x + 2)$, then find $f'(1)$.

A. 21

B. 27

C. -27

D. 3

22. Given $f(2) = 3, f'(2) = 4, g(2) = -2$, and $g'(2) = -4$. Find $h'(2)$ if $h(x) = f(x) \times g(x)$.

A. -16

B. 16

C. -20

D. 0

23. Given $f(5) = 4, f'(5) = 2, g(5) = 6$, and $g'(5) = -7$. Find $h'(5)$ if $h(x) = f(x) \times g(x)$.

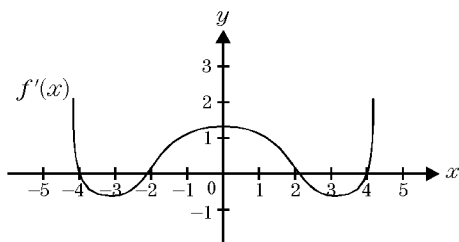
A. -16

B. 40

C. -50

D. 14

- 24.** The graph $f(x)$ has horizontal tangents when $x =$



- A. $-4, 2$
 B. $-4, -2, 2, 4$
 C. $-4, -2, 4$
 D. $2, 4$
- 25.** Find an equation for the tangent line to the graph of $f(x) = \sqrt{x+1}$ at the point where $x = 3$.
- A. $x - 4y = -5$
 B. $x + 4y = 8$
 C. $x - 4y = 5$
 D. $4x - y = -8$

- 26.** If $f(x) = x^2 - 10$, find an equation of the tangent to the curve passing through the point $(5, 1)$.

- A. $y - 1 = -10(x - 5)$
 B. $y + 5 = -10(x + 1)$
 C. $y - 1 = 10(x - 5)$
 D. $y - 5 = 10(x - 1)$

- 27.** The graph of $f(x) = \frac{3x^2}{16 - x^2}$ has a horizontal tangent at $y =$

- A. -4
 B. -3
 C. 3
 D. 0

- 28.** If $f(x) = (x - 5)^{2/3} + 1$, then the x -value of a vertical tangent is

A. 0
B. 1
C. 5
D. $\sqrt[3]{5}$

- 29.** Find the equation of the tangent line to the graph of $x^2 - 3y^2 = 1$ at the point $(2, 1)$.

A. $y - 1 = \frac{2}{3}(x - 2)$
B. $y + 1 = \frac{2}{3}(x + 2)$
C. $y - 1 = \frac{2}{3}(x - 2)$
D. $y = -\frac{3}{2}(x - 2)$

30. $\frac{d^6(x^6)}{dx^6} =$

A. $6x^5$
B. $120x$
C. 720
D. $360x^3 + 120x^2 + x$

- 31.** Find $D_{xy}^2 y$ for $y = \frac{1 - x}{x - 3}$.

A. 0
B. $\frac{-8}{(x - 3)^3}$
C. $\frac{-4}{(x - 2)^3}$
D. $\frac{-4}{(x - 3)^3}$

32. Given $y^3 = x^3 - 1$, find y'' .

A. $2xy^{-2}(1 - x^3y^{-3})$

B. $2xy^2 \left(1 - \frac{x^3}{y^3}\right)$

C. $\frac{2x^2 - 2x^2y}{y^4}$

D. $\frac{2xy^2 - x^2y}{y^4}$

33. Given $x^2 - 5xy + y = 8$, find y'' .

34. Find $f'(x)$ for $f(x) = (2x^2 + 5)^7$.

A. $7(4x)^6$

B. $(4x)^7$

C. $28x(2x^2 + 5)^6$

D. $28x^7$

35. Find $\frac{dy}{dx}$ for $y = x^3\sqrt{x+1}$.

A. $\frac{3x^2}{2\sqrt{x+1}}$

B. $\frac{x^2(7x+6)}{2\sqrt{x+1}}$

C. $\frac{7x^3 + x^2}{2\sqrt{x+1}}$

D. $\frac{x^2\sqrt{x+1}}{\sqrt{x^6+1}}$

36. If $y = \frac{(4x-3)^2}{\sqrt{x}}$, then $\frac{dy}{dx} =$

A. $\frac{3(4x-1)(4x+3)}{2x^{3/2}}$

B. $\frac{9(4x-3)}{2x^{1/2}}$

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

D. $3(4x-3)x^{-3/2}$

- 37.** Find $\frac{dy}{dx}$ at $x = -1$ given $y = u^3 - \frac{2}{u^3}$ and $u = \sqrt{3x + 4}$.

A. $\frac{2}{27}$
B. 12
C. $\frac{27}{2}$
D. 27

- 38.** If $y = \frac{u^2 + 1}{u}$ and $u = \sqrt{t + 1}$, find y' when $t = 3$.

A. $\frac{3}{16}$
B. $\frac{3}{4}$
C. 4
D. $\frac{7}{9}$

- 39.** If $x = y + 3y^2 + 4y^3$, then $y' =$

A. $\frac{1}{1 + 6y + 12y^2}$
B. $\frac{5}{6y + 1 + 12y^2}$
C. $\frac{4}{3(1 + 6y + 8y^2)}$
D. $1 + 6y + 12y^2$

- 40.** Find $\frac{dy}{dx}$ given $x^2 + y^2 = 2xy$.

A. $\frac{y + x}{y - x}$
B. 1
C. $-\frac{x}{y}$
D. $\frac{1}{2x - 2y}$

41. If $y = \frac{x}{x+y}$, then $\frac{dy}{dx} =$

A. $\frac{y}{(x+y)^2 + x}$

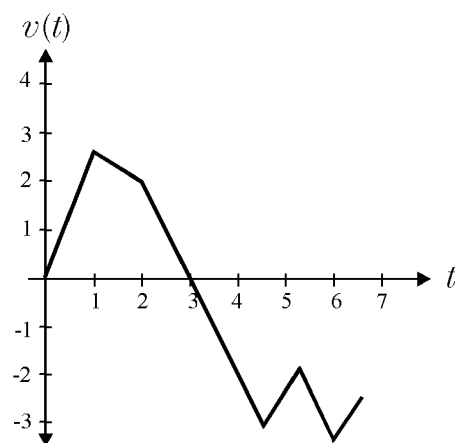
B. $\frac{1-y}{x+2y}$

C. $\frac{-1 + \sqrt{5}x}{2}$

D. $\frac{1}{1+y}$

42. A mouse is running through a straight pipe. The velocity, $v(t)$, of the mouse is given at time t for $0 \leq t \leq 7$.

According to the graph, at what time t is the mouse's speed the greatest?



A. 1

B. 3

C. 5

D. 6

- 43.** A ground hog starts at time $t = 0$ and moves along a straight path that can be described by using the x -axis so that its position at any time $t \geq 0$ is $x(t) = t^3 - 6t^2 + 9t + 12$. What is the velocity of the ground hog at $t = 0$?
- A.** -9
- B.** 0
- C.** 6
- D.** 9

1.
Answer: B
CodePath: EAS.APC.D.A.1

2.
Answer: B
CodePath: EAS.APC.D.A.3

3.
Answer: A
CodePath: EAS.APC.D.A.8

4.
Answer: B
CodePath: EAS.APC.D.B.1

5.
Answer: B
CodePath: EAS.APC.D.B.11

6.
Answer: C
CodePath: EAS.APC.D.B.14

7.
Answer: C
CodePath: EAS.APC.D.B.20

8.
Answer: B
CodePath: EAS.APC.D.B.21

9.
Answer: B
CodePath: EAS.APC.D.B.24

10.
Answer: B
CodePath: EAS.APC.D.D.3

11.
Answer: B
CodePath: EAS.APC.D.D.8

12.
Answer: A
CodePath: EAS.APC.D.D.11

13.
Answer: C
CodePath: EAS.APC.D.D.17

14.
Answer:
CodePath: EAS.APC.D.D.29

15.
Answer: D
CodePath: EAS.APC.E.B.1

16.
Answer: C
CodePath: EAS.APC.E.B.4

17.
Answer: B
CodePath: EAS.APC.E.B.23

18.
Answer: A
CodePath: EAS.APC.E.B.25

19.
Answer: A
CodePath: EAS.APC.E.B.27

20.
Answer: A
CodePath: EAS.APC.E.B.30

21.
Answer: A
CodePath: EAS.APC.E.B.39

22.
Answer: C
CodePath: EAS.APC.E.B.63

23.
Answer: A
CodePath: EAS.APC.E.B.64

24.
Answer: B
CodePath: EAS.APC.E.C.1

25.
Answer: A
CodePath: EAS.APC.E.C.3

26.
Answer: C
CodePath: EAS.APC.E.C.6

27.
Answer: D
CodePath: EAS.APC.E.C.19

28.
Answer: C
CodePath: EAS.APC.E.C.28

29.
Answer: C
CodePath: EAS.APC.E.C.60

30.
Answer: C
CodePath: EAS.APC.E.D.1

31.
Answer: D
CodePath: EAS.APC.E.D.7

32.
Answer: A
CodePath: EAS.APC.E.D.15

33.
Answer: $\frac{-398}{(5x - 1)^3}$
CodePath: EAS.APC.E.D.36

34.
Answer: C
CodePath: EAS.APC.E.F.3

35.
Answer: B
CodePath: EAS.APC.E.F.9

36.
Answer: C
CodePath: EAS.APC.E.F.17

37.
Answer: C
CodePath: EAS.APC.E.F.55

38.
Answer: A
CodePath: EAS.APC.E.F.57

39.
Answer: A
CodePath: EAS.APC.E.G.1

40.
Answer: B
CodePath: EAS.APC.E.G.5

41.
Answer: B
CodePath: EAS.APC.E.G.14

42.
Answer: D
CodePath: EAS.APC.E.I.14

43.
Answer: D
CodePath: EAS.APC.E.I.17