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QUESTION 1



Fill in the blank(s) with the correct answer. Use the lowercase letters only.

Find the derivative of the function

$$f(x) = 4x^{\frac{3}{2}}$$

,

$$x > 0$$

. Then use that function to find the derivatives at

$$x = 49$$

and

$$x = 81$$

.

$$f'(x) =$$

$$6\sqrt{x}$$



$$f'(49) =$$

$$42$$



$$f'(81) =$$

$$54$$



QUESTION 2



Drag and drop the correct answer into the space(s) provided.

Find the derivative of the function

$$f(x) = x^2 - 8x + 16$$

at

$$x = 2$$

$f'(2) =$ $\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h}$ ✓
$=$ $\lim_{h \rightarrow 0} \frac{(2+h)^2 - 8(2+h) + 16 - (4 - 16 + 16)}{h}$ ✓
$=$ $\lim_{h \rightarrow 0} \frac{4 + 4h + h^2 - 16 - 8h + 16 - 4 + 16 - 16}{h}$ ✓
$=$ $\lim_{h \rightarrow 0} \frac{h^2 - 4h}{h}$ ✓
$=$ $\lim_{h \rightarrow 0} h - 4$ ✓
$=$

-4
✓

<
>

4

$\lim_{h \rightarrow 0} \frac{h^2 + 4h}{h}$

$\lim_{h \rightarrow 0} \frac{h^2 - 12h}{h}$

$\lim_{h \rightarrow 0} h - 12$

12

$\lim_{h \rightarrow 0} h + 4$

QUESTION 3



Drag and drop the correct answer into the space(s) provided.

Find the derivative of the function

$$f(x) = \frac{15}{x}$$

at

$$x = 3$$

.

$f'(3) =$ $\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$ ✓	Definition of a derivative
=	Evaluate.

$\lim_{h \rightarrow 0} \frac{\frac{15}{3+h} - (5)}{h} \quad \checkmark$	
$=$ $\lim_{h \rightarrow 0} \frac{\frac{15 - 5(3+h)}{3+h}}{h} \quad \checkmark$	Subtract fractions.
$=$ $\lim_{h \rightarrow 0} \frac{15 - 15 - 5h}{3h + h^2} \quad \checkmark$	Distribute.
$=$ $\lim_{h \rightarrow 0} \frac{-5h}{3h + h^2} \quad \checkmark$	Combine like terms.
$=$ $\lim_{h \rightarrow 0} \frac{-5}{3+h} \quad \checkmark$	Divide by a common factor.
$=$ $-\frac{5}{3} \quad \checkmark$	Evaluate the limit.

$$\lim_{h \rightarrow 0} \frac{-20}{3+h}$$

$$\lim_{h \rightarrow 0} \frac{-10h}{3h+h^2}$$

$$\frac{-20}{3}$$

$$\frac{-10}{3}$$

$$\lim_{h \rightarrow 0} \frac{-10}{3+h}$$

$$\lim_{h \rightarrow 0} \frac{-20h}{3h+h^2}$$

QUESTION 4



Drag and drop the correct answer into the space(s) provided.

Find the derivative of the function

$$f(x) = 7x^2 + 2x$$

for any point. Then use that function to find the derivatives at

$$x = -4$$

and

$$x = 5$$

$f'(x) =$ $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$
$=$

$$\lim_{h \rightarrow 0} \frac{7(x+h)^2 + 2(x+h) - (7x^2 + 2x)}{h} \quad \checkmark$$

=

$$\lim_{h \rightarrow 0} \frac{7(x^2 + 2xh + h^2) + 2(x+h) - (7x^2 + 2x)}{h} \quad \checkmark$$

=

$$\lim_{h \rightarrow 0} \frac{7x^2 + 14xh + 7h^2 + 2x + 2h - 7x^2 - 2x}{h} \quad \checkmark$$

=

$$\lim_{h \rightarrow 0} \frac{14xh + 7h^2 + 2h}{h} \quad \checkmark$$

=

$$\lim_{h \rightarrow 0} 14x + 7h + 2 \quad \checkmark$$

=

$$14x + 2 \quad \checkmark$$

So,

$$f'(-4) =$$

$$-54 \quad \checkmark \quad \text{and}$$

$$f'(5) =$$

72



- 26

 $14x + 7$

37

 $7x + 2$

77

- 49

QUESTION 5



Drag and drop the correct answer into the space(s) provided.

Find the derivative of the function

$$f(x) = 5x^2 + 9x$$

for any point. Then use that function to find the derivatives at

$$x = -8$$

and

$$x = 4$$

$$f'(x) =$$

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

=

$$\lim_{h \rightarrow 0} \frac{5(x+h)^2 + 9(x+h) - (5x^2 + 9x)}{h}$$



=

$$\lim_{h \rightarrow 0} \frac{5(x^2 + 2xh + h^2) + 9(x + h) - (5x^2 + 9x)}{h} \quad \checkmark$$

=

$$\lim_{h \rightarrow 0} \frac{5x^2 + 10xh + 5h^2 + 9x + 9h - 5x^2 - 9x}{h} \quad \checkmark$$

=

$$\lim_{h \rightarrow 0} \frac{10xh + 5h^2 + 9h}{h} \quad \checkmark$$

=

$$\lim_{h \rightarrow 0} 10x + 5h + 9 \quad \checkmark$$

=

$$10x + 9 \quad \checkmark$$

So

$$f'(-8) =$$

$$-71 \quad \checkmark$$

and

$$f'(4) =$$

$$49 \quad \checkmark$$

29

- 31

 $10x + 5$

- 75

45

 $5x + 9$

QUESTION 6



Drag and drop the correct answer into the space(s) provided.

Find the derivative of the function

$$f(x) = 4x^2 - 5x$$

for any point. Then use that function to find the derivatives at

$$x = -7$$

and

$$x = 6$$

$$f'(x) =$$

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

$$=$$

$$\lim_{h \rightarrow 0} \frac{4(x+h)^2 - 5(x+h) - (4x^2 - 5x)}{h} \quad \checkmark$$

$$=$$

$$\lim_{h \rightarrow 0} \frac{4(x^2 + 2xh + h^2) - 5(x + h) - (4x^2 - 5x)}{h}$$

=

$$\lim_{h \rightarrow 0} \frac{4x^2 + 8xh + 4h^2 - 5x - 5h - 4x^2 + 5x}{h}$$

=

$$\lim_{h \rightarrow 0} \frac{8xh + 4h^2 - 5h}{h}$$

=

$$\lim_{h \rightarrow 0} 8x + 4h - 5$$

=

$$8x - 5$$

So,

$$f'(-7) =$$

$$-61$$

and

$$f'(6) =$$

$$43$$

48

52

 $8x$ -52 -56 $8x + 4$

QUESTION 7



Fill in the blank(s) with the correct answer.

Find the derivative of the function

$$f(x) = 36\sqrt{x} + 5$$

,

$$x > 0$$

. Then use that function to find the derivatives at

$$x = 9$$

and

$$x = 36$$

.

$$f'(x) =$$

$$\frac{18}{\sqrt{x}}$$



$$f'(9) =$$

6



$$f'(36) =$$

3



QUESTION 8



Fill in the blank(s) with the correct answer.

Find the derivative of the function

$$f(x) = 64\sqrt{x}$$

,

$$x > 0$$

. Then use that function to find the derivatives at

$$x = 4$$

and

$$x = 16$$

.

$$f'(x) =$$

$$\frac{32}{\sqrt{x}}$$



$$f'(4) =$$

$$16$$



$$f'(16) =$$

$$8$$



QUESTION 9



Choose the correct answer from the drop-down menu.

Find the derivative of the function

$$f(x) = -\frac{3}{x}(x \neq 0)$$

. Then use that function to find the derivatives at

$$x = -6$$

and

$$x = 2$$

$$f'(x) =$$

$$\frac{3}{x^2} \quad \checkmark \quad \blacktriangledown$$

$$f'(-6) =$$

$$\frac{1}{12} \quad \checkmark \quad \blacktriangledown$$

$$f'(2) =$$

$$\frac{3}{4} \quad \checkmark \quad \blacktriangledown$$

QUESTION 10



Choose the correct answer from the drop-down menu.

Find the derivative of the function

$$f(x) = \frac{7}{x}(x \neq 0)$$

. Then use that function to find the derivatives at

$$x = -1$$

and

$$x = 5$$

.

$$f'(x) =$$

$$-\frac{7}{x^2} \quad \checkmark \quad \blacktriangledown$$

$$f'(-1) =$$

$$-7 \quad \checkmark \quad \blacktriangledown$$

$$f'(5) =$$

$$-\frac{7}{25} \quad \checkmark \quad \blacktriangledown$$

QUESTION 11



Choose the correct answer from the drop-down menu.

Find the derivative of the function

$$f(x) = \frac{36}{x^2} \quad (x \neq 0)$$

. Then use that function to find the derivatives at

$$x = -2$$

and

$$x = 4$$

.

$$f'(x) =$$

$$-\frac{72}{x^3} \quad \checkmark \quad \blacktriangledown$$

$$f'(-2) =$$

$$9 \quad \checkmark \quad \blacktriangledown$$

$$f'(4) =$$

$$-\frac{9}{8} \quad \checkmark \quad \blacktriangledown$$

QUESTION 12



Choose the correct answer from the drop-down menu.

Find the derivative of the function

$$f(x) = 2\sqrt{x}$$

at

$$x = 9$$

.

$$f'(9) =$$

$$\lim_{h \rightarrow 0} \frac{f(9+h) - f(9)}{h}$$

Definition of a derivative

=

$$\lim_{h \rightarrow 0} \frac{2\sqrt{9+h} - 6}{h}$$

Evaluate.

$$f'(9) =$$

$\frac{1}{3}$
✓
▼

QUESTION 13



Choose the correct answer from the drop-down menu.

Find the derivative of the function

$$f(x) = \sqrt{x} + 6$$

at

$$x = 4$$

.

$$f'(4) =$$

$$\lim_{h \rightarrow 0} \frac{f(4+h) - f(4)}{h}$$

Definition of a derivative

=

$$\lim_{h \rightarrow 0} \frac{\sqrt{4+h} + 6 - (2+6)}{h}$$

Evaluate.

$$f'(4) =$$

$\frac{1}{4}$
✓
▼

QUESTION 14



Select the correct option.

Which expression finds the derivative of

$$f(x) = 3x - 4$$

at

$$x = 3$$

?

☒

$$\lim_{h \rightarrow 0} \frac{3(3+h) - 4 - (3(3) - 4)}{h}$$

✓

☐

$$\lim_{h \rightarrow 0} \frac{3(h+3) - 4}{h}$$

☐

$$\lim_{h \rightarrow 0} \frac{3(3+h) - 4 + (3(3) - 4)}{h}$$

☐

$$\lim_{h \rightarrow 0} \frac{3(h) - 4 - (3(3) - 4)}{h}$$

$h \rightarrow 0$ h

QUESTION 15



Select the correct option.

Which equation defines the derivative of the function

 f

at a point where

 $x = x_1$

?



$$f'(x_1) = \lim_{h \rightarrow x_1} \frac{f(x_1 + h) - f(x_1)}{h}$$

$$f'(x_1) = \lim_{h \rightarrow 0} \frac{f(x_1 + h) - f(x_1)}{h}$$



$$f'(x_1) = \lim_{h \rightarrow 0} \frac{f(x_1 - h) + f(x_1)}{h}$$



$$f'(x_1) = \lim_{h \rightarrow x_1} \frac{f(x_1 - h) + f(x_1)}{h}$$

