

Evaluate Derivatives at Points

Differentiate, then evaluate the derivative at the given exact point.

1.

$$f(x) = \frac{1}{2} \cdot x^2 - 1$$

$$\text{at } x = 0$$

Find $f'(x_0)$.

2.

$$f(x) = 2 \cdot \csc(2 \cdot x) - 1$$

$$\text{at } x = \frac{2}{3} \cdot \pi$$

Find $f'(x_0)$.

3.

$$f(x) = 3 \cdot e^{2 \cdot x} - 2$$

$$\text{at } x = 2$$

Find $f'(x_0)$.

4.

$$f(x) = \frac{\frac{1}{2} \cdot x^2}{-3 \cdot x + 1}$$

$$\text{at } x = 0$$

Find $f'(x_0)$.

5.

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

$$\text{at } x = \frac{3}{2}$$

Find $f'(x_0)$.

6.

$$f(x) = 3 \cdot \cot(-2 \cdot x) - 2$$

$$\text{at } x = \frac{-5}{8} \cdot \pi$$

Find $f'(x_0)$.

Evaluate Derivatives at Points

Differentiate, then evaluate the derivative at the given exact point.

7.

$$f(x) = 2 \cdot e^{-x+2} - 1$$

$$\text{at } x = -2$$

Find $f'(x_0)$.

8.

$$f(x) = \frac{-\frac{1}{2} \cdot x - 2 \cdot x^2 - 3 \cdot x^3 - 1}{-\frac{1}{2} \cdot x - 3}$$

$$\text{at } x = -3$$

Find $f'(x_0)$.

Evaluate Derivatives at Points

Answer Key

Differentiate, then evaluate the derivative at the given exact point.

1. $f(x) = \frac{1}{2} \cdot x^2 - 1$

$$f'(x) = x$$

$$f'(x_0) = -1$$

$$f'(x_0) = 0$$

All real x.

2. $f(x) = 2 \cdot \csc(2 \cdot x) - 1$

$$f'(x) = -4 \cdot \csc(2 \cdot x) \cdot \cot(2 \cdot x)$$

$$f'(x_0) = -\frac{4}{3} \cdot \sqrt{3} - 1$$

$$f'(x_0) = \frac{8}{3}$$

$\sin(2 \cdot x) \neq 0$.

3. $f(x) = 3 \cdot e^{2 \cdot x} - 2$

$$f'(x) = 6 \cdot e^{2 \cdot x}$$

$$f'(x_0) = 3 \cdot e^4 - 2$$

$$f'(x_0) = 6 \cdot e^4$$

All real x.

4. $f(x) = \frac{\frac{1}{2} \cdot x^2}{-3 \cdot x + 1}$

$$f'(x) = \frac{x \cdot (-3 \cdot x + 1) + \frac{3}{2} \cdot x^2}{(-3 \cdot x + 1)^2}$$

$$f'(x_0) = 0$$

$$f'(x_0) = 0$$

$-3 \cdot x + 1 \neq 0$ (original denominator).

5. $f(x) = 2 \cdot x - 3 \cdot x^2 + 1$

$$f'(x) = -6 \cdot x + 2$$

$$f'(x_0) = \frac{-11}{4}$$

$$f'(x_0) = -7$$

All real x.

6. $f(x) = 3 \cdot \cot(-2 \cdot x) - 2$

$$f'(x) = 6 \cdot \csc(-2 \cdot x)^2$$

$$f'(x_0) = 1$$

$$f'(x_0) = 12$$

$\sin(-2 \cdot x) \neq 0$.

7. $f(x) = 2 \cdot e^{-x+2} - 1$

$$f'(x) = -2 \cdot e^{-x+2}$$

$$f'(x_0) = 2 \cdot e^4 - 1$$

$$f'(x_0) = -2 \cdot e^4$$

All real x.

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

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Answer Key

Differentiate, then evaluate the derivative at the given exact point.

8. $f(x) = \frac{-\frac{1}{2}x - 2x^2 - 3x^3 - 1}{-\frac{1}{2}x - 3}$

$$f'(x) = \frac{\left(-4x - 9x^2 - \frac{1}{2}\right)\left(-\frac{1}{2}x - 3\right) + \frac{1}{2}\left(-\frac{1}{2}x - 2x^2 - 3x^3 - 1\right)}{\left(-\frac{1}{2}x - 3\right)^2}$$

$$f'(x_0) = \frac{-127}{3}$$

$$f'(x_0) = \frac{544}{9}$$

$-1/2 \cdot x + -3 \neq 0$ (original denominator).