Higher Order Derivatives

For each problem, find the indicated derivative with respect to x.

1) $y = -x^2$ Find $\dfrac{d^2y}{dx^2}$

2) $f(x) = 4x^3$ Find f''

3) $y = -4x$ Find $\dfrac{d^3y}{dx^3}$

4) $f(x) = 5x^4$ Find f'''

5) $y = -5x^4$ Find $\dfrac{d^4y}{dx^4}$

6) $y = 3x^5 - 2x$ Find $\dfrac{d^3y}{dx^3}$

7) $y = -2x^3 - 4x^{-3}$ Find $\dfrac{d^3y}{dx^3}$

8) $y = -x^2 + 2\sqrt[5]{x^2}$ Find $\dfrac{d^3y}{dx^3}$

Critical thinking questions. Find the indicated derivatives with respect to x.

9) $y = 99x^{99}$ Find $\dfrac{d^{100}y}{dx^{100}}$

10) $f(x) = x^{99}$ Find $f^{(99)}$

Higher Derivatives Rule … Set 1

Answers

For each problem, find the indicated derivative with respect to x.

1) $y = -x^2$ Find $\dfrac{d^2y}{dx^2}$

$\dfrac{d^2y}{dx^2} = -2$

2) $f(x) = 4x^3$ Find f''

$f''(x) = 24x$

3) $y = -4x$ Find $\dfrac{d^3y}{dx^3}$

$\dfrac{d^3y}{dx^3} = 0$

4) $f(x) = 5x^4$ Find f'''

$f'''(x) = 120x$

5) $y = -5x^4$ Find $\dfrac{d^4y}{dx^4}$

$\dfrac{d^4y}{dx^4} = -120$

6) $y = 3x^5 - 2x$ Find $\dfrac{d^3y}{dx^3}$

$\dfrac{d^3y}{dx^3} = 180x^2$

7) $y = -2x^3 - 4x^{-3}$ Find $\dfrac{d^3y}{dx^3}$

$\dfrac{d^3y}{dx^3} = -12 + \dfrac{240}{x^6}$

8) $y = -x^2 + 2\sqrt[5]{x^2}$ Find $\dfrac{d^3y}{dx^3}$

$\dfrac{d^3y}{dx^3} = \dfrac{96}{125x^{\frac{13}{5}}}$

Critical thinking questions. Find the indicated derivatives with respect to x.

9) $y = 99x^{99}$ Find $\dfrac{d^{100}y}{dx^{100}}$

The 99th derivative is a constant, so 100th derivative is 0.

10) $f(x) = x^{99}$ Find $f^{(99)}$

99! (Made easy by factorial notation)

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