

Higher Order Derivatives

Differentiate each function through the requested order. Keep coefficients and powers exact, and use the stated real domain at every stage.

1. Find d^3y/dx^3 .

$y = \frac{-4}{3} \cdot x^4$

Domain: all real x.

2. Find d^4y/dx^4 .

$y = -\frac{5}{2} \cdot x^6 - \frac{9}{2}$

Domain: all real x.

3. Find d^3y/dx^3 .

$y = 4 \cdot x^6 + \frac{3}{2} \cdot x^3 + 6 \cdot x$

Domain: all real x.

4. Find d^4y/dx^4 .

$y = \frac{-9}{2} \cdot x^8$

Domain: all real x.

Higher Order Derivatives

Differentiate each function through the requested order. Keep coefficients and powers exact, and use the stated real domain at every stage.

5. Find d^3y/dx^3 .

$y = -\frac{7}{2} \cdot x^8 - \frac{9}{2} \cdot x^4$

Domain: all real x.

6. Find d^4y/dx^4 .

$y = \frac{7}{3} \cdot x^3 + 12 \cdot x^2 + 4 \cdot x$

Domain: all real x.

7. Find d^3y/dx^3 .

$y = -5 \cdot x^5$

Domain: all real x.

8. Find d^4y/dx^4 .

$y = -9 \cdot x^8 - \frac{7}{2} \cdot x$

Domain: all real x.

Higher Order Derivatives

Differentiate each function through the requested order. Keep coefficients and powers exact, and use the stated real domain at every stage.

9. Find d^3y/dx^3 .

$y = -\frac{5}{2} \cdot x^8 + 4 \cdot x^7 - \frac{8}{3} \cdot x^6$

Domain: all real x.

10. Find d^4y/dx^4 .

$y = 5 \cdot x^6$

Domain: all real x.

Higher Order Derivatives

Worked Answer Key

Differentiate each function through the requested order. Keep coefficients and powers exact, and use the stated real domain at every stage.

1. Find d^3y/dx^3 .

$$y = \frac{-4}{3} \cdot x^4$$

Domain: all real x .

$$dy/dx = \frac{-16}{3} \cdot x^3$$

Domain: all real x .

$$d^2y/dx^2 = -16 \cdot x^2$$

Domain: all real x .

$$d^3y/dx^3 = -32 \cdot x$$

Domain: all real x .

2. Find d^4y/dx^4 .

$$y = -\frac{5}{2} \cdot x^6 - \frac{9}{2}$$

Domain: all real x .

$$dy/dx = -15 \cdot x^5$$

Domain: all real x .

$$d^2y/dx^2 = -75 \cdot x^4$$

Domain: all real x .

$$d^3y/dx^3 = -300 \cdot x^3$$

Domain: all real x .

$$d^4y/dx^4 = -900 \cdot x^2$$

Domain: all real x .

3. Find d^3y/dx^3 .

$$y = 4 \cdot x^6 + \frac{3}{2} \cdot x^3 + 6 \cdot x$$

Domain: all real x .

$$dy/dx = 24 \cdot x^5 + \frac{9}{2} \cdot x^2 + 6$$

Domain: all real x .

$$d^2y/dx^2 = 120 \cdot x^4 + 9 \cdot x$$

Domain: all real x .

$$d^3y/dx^3 = 480 \cdot x^3 + 9$$

Domain: all real x .

4. Find d^4y/dx^4 .

$$y = \frac{-9}{2} \cdot x^8$$

Domain: all real x .

$$dy/dx = -36 \cdot x^7$$

Domain: all real x .

$$d^2y/dx^2 = -252 \cdot x^6$$

Domain: all real x .

$$d^3y/dx^3 = -1512 \cdot x^5$$

Domain: all real x .

$$d^4y/dx^4 = -7560 \cdot x^4$$

Domain: all real x .

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

Higher Order Derivatives

Worked Answer Key

Differentiate each function through the requested order. Keep coefficients and powers exact, and use the stated real domain at every stage.

5. Find d^3y/dx^3 .

$$y = -\frac{7}{2} \cdot x^8 - \frac{9}{2} \cdot x^4$$

Domain: all real x.

$$dy/dx = -28 \cdot x^7 - 18 \cdot x^3$$

Domain: all real x.

$$d^2y/dx^2 = -196 \cdot x^6 - 54 \cdot x^2$$

Domain: all real x.

$$d^3y/dx^3 = -1176 \cdot x^5 - 108 \cdot x$$

Domain: all real x.

6. Find d^4y/dx^4 .

$$y = \frac{7}{3} \cdot x^3 + 12 \cdot x^2 + 4 \cdot x$$

Domain: all real x.

$$dy/dx = 7 \cdot x^2 + 24 \cdot x + 4$$

Domain: all real x.

$$d^2y/dx^2 = 14 \cdot x + 24$$

Domain: all real x.

$$d^3y/dx^3 = 14$$

Domain: all real x.

$$d^4y/dx^4 = 0$$

Domain: all real x.

7. Find d^3y/dx^3 .

$$y = -5 \cdot x^5$$

Domain: all real x.

$$dy/dx = -25 \cdot x^4$$

Domain: all real x.

$$d^2y/dx^2 = -100 \cdot x^3$$

Domain: all real x.

$$d^3y/dx^3 = -300 \cdot x^2$$

Domain: all real x.

8. Find d^4y/dx^4 .

$$y = -9 \cdot x^8 - \frac{7}{2} \cdot x$$

Domain: all real x.

$$dy/dx = -72 \cdot x^7 - \frac{7}{2}$$

Domain: all real x.

$$d^2y/dx^2 = -504 \cdot x^6$$

Domain: all real x.

$$d^3y/dx^3 = -3024 \cdot x^5$$

Domain: all real x.

$$d^4y/dx^4 = -15120 \cdot x^4$$

Domain: all real x.

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Higher Order Derivatives

Worked Answer Key

Differentiate each function through the requested order. Keep coefficients and powers exact, and use the stated real domain at every stage.

9. Find d^3y/dx^3 .

$$y = -\frac{5}{2} \cdot x^8 + 4 \cdot x^7 - \frac{8}{3} \cdot x^6$$

Domain: all real x.

$$dy/dx = -20 \cdot x^7 + 28 \cdot x^6 - 16 \cdot x^5$$

Domain: all real x.

$$d^2y/dx^2 = -140 \cdot x^6 + 168 \cdot x^5 - 80 \cdot x^4$$

Domain: all real x.

$$d^3y/dx^3 = -840 \cdot x^5 + 840 \cdot x^4 - 320 \cdot x^3$$

Domain: all real x.

10. Find d^4y/dx^4 .

$$y = 5 \cdot x^6$$

Domain: all real x.

$$dy/dx = 30 \cdot x^5$$

Domain: all real x.

$$d^2y/dx^2 = 150 \cdot x^4$$

Domain: all real x.

$$d^3y/dx^3 = 600 \cdot x^3$$

Domain: all real x.

$$d^4y/dx^4 = 1800 \cdot x^2$$

Domain: all real x.