Name _____ Score _____ Teacher _____ Date _____

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.

Domains use ordinary two-sided real derivatives. Keep exact fractions and powers.

Name _____ Score _____ Teacher _____ Date _____

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.

Domains use ordinary two-sided real derivatives. Keep exact fractions and powers.

Name _____ Score _____ Teacher _____ Date _____

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.

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.

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.

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.

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.

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.