Name _____ Score _____ Teacher _____ Date _____

Symbolic Differentials

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

1. y = 1(2x^3-3x+2)^2

Find dy.

2. y = -x^3+5x-2

Find dy.

3. y = 4cos(2x+6)

Find dy.

4. y = (2x-3)/(-x+2)

Find dy.

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Symbolic Differentials

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

5. y = 1(-2x^2+1)^-2

Find dy.

6. y = -3x^2+2x+7

Find dy.

7. y = 2tan(5x+1)

Find dy.

8. y = (2x^2-1)/(x^2+x-1)

Find dy.

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Symbolic Differentials

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

9. y = 1(x^2+2x-1)^3

Find dy.

10. y = x^4-2x^2+3

Find dy.

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Symbolic Differentials

Worked Answer Key

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

1. y = 1(2x^3-3x+2)^2

Let u = 2x^3-3x+2; then u' = 6x^2-3.

Chain rule: 1(2)u^1u'.

f'(x) = 2(2x^3-3x+2)^1(6x^2-3)

Therefore dy = (2(2x^3-3x+2)^1(6x^2-3)) dx

2. y = -x^3+5x-2

Power rule term by term: d/dx [-2] = 0; d/dx [5x] = 5; d/dx [-x^3] = -3x^2.

f'(x) = -3x^2+5

Therefore dy = (-3x^2+5) dx

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Symbolic Differentials

Worked Answer Key

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

3. y = 4cos(2x+6)

d/dx [cos(u)] = -sin(u)u'

Inner derivative: u' = 2

f'(x) = -8sin(2x+6)

Therefore dy = (-8sin(2x+6)) dx

4. y = (2x-3)/(-x+2)

N = 2x-3; D = -x+2.

N' = 2; D' = -1.

Quotient rule: f' = (N'D - ND')/D^2.

f'(x) = [(2)(-x+2)-(2x-3)(-1)]/(-x+2)^2

Therefore dy = ([(2)(-x+2)-(2x-3)(-1)]/(-x+2)^2) dx

Original domain: -x+2 != 0.

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Symbolic Differentials

Worked Answer Key

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

5. y = 1(-2x^2+1)^-2

Let u = -2x^2+1; then u' = -4x.

Chain rule: 1(-2)u^-3u'.

f'(x) = -2(-2x^2+1)^-3(-4x)

Therefore dy = (-2(-2x^2+1)^-3(-4x)) dx

Original domain: -2x^2+1 != 0.

6. y = -3x^2+2x+7

Power rule term by term: d/dx [7] = 0; d/dx [2x] = 2; d/dx [-3x^2] = -6x.

f'(x) = -6x+2

Therefore dy = (-6x+2) dx

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Symbolic Differentials

Worked Answer Key

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

7. y = 2tan(5x+1)

d/dx [tan(u)] = sec^2(u)u'

Inner derivative: u' = 5

f'(x) = 10sec^2(5x+1)

Therefore dy = (10sec^2(5x+1)) dx

Original domain: cos(5x+1) != 0.

8. y = (2x^2-1)/(x^2+x-1)

N = 2x^2-1; D = x^2+x-1.

N' = 4x; D' = 2x+1.

Quotient rule: f' = (N'D - ND')/D^2.

f'(x) = [(4x)(x^2+x-1)-(2x^2-1)(2x+1)]/(x^2+x-1)^2

Therefore dy = ([(4x)(x^2+x-1)-(2x^2-1)(2x+1)]/(x^2+x-1)^2) dx

Original domain: x^2+x-1 != 0.

Name _____ Score _____ Teacher _____ Date _____

Symbolic Differentials

Worked Answer Key

For each function, find the exact differential dy = f'(x) dx. Keep the full derivative grouped as the coefficient of dx.

9. $y = 1(x^2+2x-1)^3$

Let $u = x^2+2x-1$; then $u' = 2x+2$.

Chain rule: $1(3)u^2u'$.

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

Therefore $dy = (3(x^2+2x-1)^2(2x+2))\,dx$

10. $y = x^4-2x^2+3$

Power rule term by term: $d/dx\,[3] = 0$; $d/dx\,[-2x^2] = -4x$; $d/dx\,[x^4] = 4x^3$.

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

Therefore $dy = (4x^3-4x)\,dx$