Calculus AB

Name_____

# Worksheet 7 - Differentials and Product Rule

Period____

**For each problem, find the differential *dy*.**

1) $y = -x^2 - 4x - 3$

2) $y = -x^3 + 3$

3) $y = -\sqrt{x}$

4) $y = \dfrac{1}{x}$

**Differentiate each function with respect to the given variable.**

5) $f(t) = \left(-\sqrt[6]{t} - 3\right)\left(t^3 + 2\right)$

6) $r = \left(1 - \dfrac{3}{s^8}\right)\left(2s^4 + 4s^3 + 4\right)$

8) $g(r) = \left(-4\sqrt[7]{r} - 1\right) \cdot -3r^4$

7) $s = \left(-2x^{\frac{5}{4}} - 5\right)\left(-4x^{10} - 1\right)$

9) $g(x) = \left(-4\sqrt[8]{x^3} + 5\right)\left(x^5 + 4\right)$

10) $h(w) = \left(5w^{\frac{5}{9}} - 5\right) \cdot -w^3$

11) $r = \left(5s^4 - 2\right)\tan s$

12) $t = \cos x \cdot \left(5x^2 - 3\right)$

13) $g = \left(-5t^2 + 4\right)\sin t$

For each problem, you are given a table containing some values of differentiable functions $f(x)$, $g(x)$ and their derivatives. Use the table data and the rules of differentiation to solve each problem.

14)

| $x$ | $f(x)$ | $f'(x)$ | $g(x)$ | $g'(x)$ |
|---|---|---|---|---|
| 1 | 3 | −1 | 1 | 1 |
| 2 | 2 | −1 | 2 | $\dfrac{3}{2}$ |
| 3 | 1 | 0 | 4 | 0 |
| 4 | 2 | 1 | 2 | −2 |

Given $h(x) = f(x) \cdot g(x)$, find $h'(3)$

15)

| $x$ | $f(x)$ | $f'(x)$ | $g(x)$ | $g'(x)$ |
|---|---|---|---|---|
| 1 | 1 | 2 | 4 | −2 |
| 2 | 3 | $\dfrac{3}{2}$ | 2 | $-\dfrac{3}{2}$ |
| 3 | 4 | 0 | 1 | $\dfrac{1}{2}$ |
| 4 | 3 | −1 | 3 | 2 |

Given $h(x) = f(x) \cdot g(x)$, find $h'(1)$

16)

| $x$ | $f(x)$ | $f'(x)$ | $g(x)$ | $g'(x)$ |
|---|---|---|---|---|
| 1 | 1 | 2 | 6 | −2 |
| 2 | 3 | 2 | 4 | $-\dfrac{3}{2}$ |
| 3 | 5 | $\dfrac{3}{2}$ | 3 | $-\dfrac{3}{2}$ |
| 4 | 6 | $-\dfrac{1}{2}$ | 1 | 0 |
| 5 | 4 | −2 | 3 | $\dfrac{3}{2}$ |
| 6 | 2 | −2 | 4 | 1 |

Given $h(x) = f(x) \cdot g(x)$, find $h'(5)$