

Name _____

More Derivatives

Use the following for 1-4:

$$f(2) = -3 \quad g(2) = 5 \quad f'(2) = 4 \quad g'(2) = -2 \quad f'(5) = 6$$

Find the derivative of the following at $x = 2$:

1. Find $h'(2)$ if $h(x) = \frac{f(x)}{g(x)}$

2. $f + g$

3. $f \cdot g$

4. $f(g(x))$

5. The position function of a moving particle is given by $s(t) = 3t^3 + 2t - 1$, where s is measured in feet and t is measured in seconds. Find the instantaneous acceleration at $t=2.5$ seconds.

6. A coin is dropped from a height of 850 ft (s_0).

$$s(t) = -16t^2 + s_0.$$

a) Find the average velocity on the interval $[2,3]$.

b) Find the instantaneous velocity at $t=1.5$ seconds.

For problems 7-89, let $f(2) = 4$, $f'(2) = 8$, $g(2) = 5$, and $g'(2) = \frac{1}{2}$.

7. Find $h'(2)$ if $h(x) = \frac{f(x)}{g(x)}$.

8. Find $h'(2)$ if $h(x) = f(x)g(x)$.

Find the derivative of each of the following functions.

9. $f(x) = \sqrt[4]{x} + \sqrt[3]{x}$

10. $f(t) = \frac{2t}{t^3 + 1}$

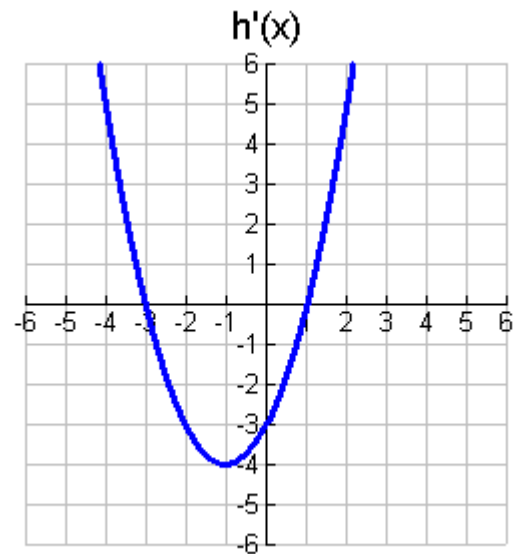
11. $f(x) = \sqrt[3]{x}(4x^2 + 1)$

12. $m(x) = 3 \csc x \cot x$

13. If $f(x) = -2x^4 + 4x^3 + 8x + 3$, find $f''(x)$.

14. If $f(x) = 3x^2 + 5x + \cos x$, find $f''(x)$.

15. Use the graph of $h'(x)$ to sketch a graph of $h(x)$.



16. A potato is launched vertically from the top of a 100 ft building with an initial velocity of 80 ft/s.

Remember the free fall equation:

$$h(t) = -16t^2 + v_0t + h_0.$$

a) Find the average velocity over the first three seconds.
Indicate units.

b) Find the time, c , such that the instantaneous velocity at c is equal to the average velocity $(0, 3)$.

Differentiate implicitly:

17. $x^3 + x^2y + 4y^2 = 6$

18. $x^2y + xy^2 = 3x$

19. $x^2y^2 + x \sin y = 4$

20. $4 \cos x \sin y = 1$

21. $e^{x/y} = x - y$

22. $f(x) + x^2[f(x)]^3 = 10$ and $f(1) = 2$, find $f'(1)$.

23. Use implicit differentiation to find an equation of the tangent line to $x^2 + xy + y^2 = 3$ at the point $(1, 1)$.