Answer Key

AP Calculus AB

Power, Product, Quotient Rule Worksheet

Use either the Product or Quotient Rules to find the derivatives.

1. $f(x)=x^3\left(2x^2+1\right)$

$f'(x) = 10x^4 + 3x^2$

2. $f(x)=(3x-5)\left(2x^2-3\right)$

$f'(x) = 18x^2 - 20x - 9$

3. $f(x)=\dfrac{x}{x-2}$

$f'(x) = \dfrac{-2}{(x-2)^2}$

4. $f(x)=\dfrac{x+4}{x^2+x+1}$

$f'(x) = \dfrac{-x^2-8x-3}{(x^2+x+1)^2}$

5. $\left.\dfrac{dh}{ds}\right|_{s=4}$, $h(s)=\left(s^{-1/2}+2s\right)\left(7-s^{-1}\right)$

$\left.\dfrac{dh}{ds}\right|_{s=4} = \dfrac{871}{64}$

6. $\left.\dfrac{dy}{dx}\right|_{x=3}$, $\dfrac{1}{x+10}$

$\left.\dfrac{dy}{dx}\right|_{x=3} = \dfrac{-1}{169}$

First find the derivative using the Product Rule. Then rewrite the function algebraically and apply the Power Rule directly.

7. $f(x)=x^2\left(3+x^{-1}\right)$

$f'(x) = 6x + 1$

First find the derivative using the Quotient Rule. Then rewrite the function algebraically and apply the Power Rule directly.

8. $g(t)=\dfrac{t^2-1}{t-1}$

$g'(t) = 1$

Calculate the derivative.

9. $f(x)=(x^3+5)(x^3+x+1)$

$f'(x) = 6x^5 + 4x^3 + 18x^2 + 5$

10. $f(x)=(\sqrt{x}-1)(\sqrt{x}+1)$

$f'(x) = 1$

11. $f(x)=\dfrac{9x^{5/2}-2}{x}$

$f'(x) = \frac{27}{2}x^{\frac{1}{2}} + 2x^{-2}$

12. $f(x)=\dfrac{3x^3-x^2+2}{\sqrt{x}}$

$f'(x) = \frac{15}{2}x^{\frac{3}{2}} - \frac{3}{2}x^{\frac{1}{2}} - x^{-\frac{3}{2}}$

$f(4)$	$f'(4)$	$g(4)$	$g'(4)$
10	−2	5	−1

Using the table above, calculate the following derivatives.

13. $(fg)'(4)$

-20

14. $\left(\dfrac{f}{g}\right)'(4)$

0

15. $F'(4)$, where $F(x)=x^2 f(x)$

48

16. $G'(4)$, where $G(x)=\dfrac{x}{f(x)g(x)}$

$\frac{13}{250}$