

PRODUCT RULE AND QUOTIENT RULE

Differentiate. Use proper notation and simplify your final answers. In some cases it might be advantageous to simplify/rewrite first. Do not use rules found in later sections.

1. $f(x) = (1 + \sqrt{x})(x^3)$

2. $g(t) = \left(\frac{2}{t} + t^5\right)(t^3 + 1)$

3. $h(y) = \frac{1}{y^3 + 2y + 1}$

4. $y = \frac{1}{x + \sqrt{x}}$

5. $y = 2^x e^x$

6. $g(z) = \frac{z^2 + 1}{z^3 - 5}$

7. $y = \frac{\sqrt{x}}{x^3 + 1}$

8. $z = \frac{t^2}{(t-4)(2-t^3)}$

9. $h(x) = \frac{(x^3 + 1)\sqrt{x}}{x^2}$

10. $y(m) = \frac{(e^m)(\sqrt[3]{m})}{m^2 + 3}$

11. $g(x) = (x + \sqrt{x})(3^x)$

12. Let $f(x) = g(x)h(x)$, $g(10) = -4$, $h(10) = 560$, $g'(10) = 0$, and $h'(10) = 35$. Find $f'(10)$.

13. Let $y(x) = \frac{z(x)}{1+x^2}$, $z(-3) = 6$, and $z'(-3) = 15$. Find $y'(-3)$.