



This worksheet will help you learn how to differentiate products of functions using the product rule. Work through each question carefully and show all your steps.

Easy Questions

1. Differentiate $f(x) = x(x + 1)$ using the product rule.
2. Differentiate $f(x) = (2x)(x^2)$ using the product rule.
3. Differentiate $f(x) = 3(x^2 + 1)$ using the product rule.
4. Differentiate $f(x) = (x - 3)(2x + 5)$ using the product rule.
5. Differentiate $f(x) = (x + 2)(x + 2)$ using the product rule.

Intermediate Questions

6. Differentiate $f(x) = (3x^2 + 2x)(x - 1)$ using the product rule.
7. Differentiate $f(x) = x^3(4x + 7)$ using the product rule.
8. Differentiate $f(x) = (5x - 4)(2x^2 + 3)$ using the product rule.
9. Differentiate $f(x) = (x^2 + 5)(x^2 - 3x + 2)$ using the product rule.
10. Differentiate $f(x) = (3 - 2x)(x^2 + 4)$ using the product rule.
11. Differentiate $f(x) = (x^3 + 2x)(2x - 1)$ using the product rule.
12. Differentiate $f(x) = (4x + 3)(x^2 - x + 1)$ using the product rule.
13. Differentiate $f(x) = (2x + 1)(x^3 - x)$ using the product rule.
14. Differentiate $f(x) = x^2(5 - x)$ using the product rule.
15. Differentiate $f(x) = (x - 2)(x^2 + 2x + 3)$ using the product rule.
16. Differentiate $f(x) = (2x^2 - 3)(x + 1)$ using the product rule.
17. Differentiate $f(x) = (x^2 + 1)(3x - 2)$ using the product rule.
18. Differentiate $f(x) = (2x + 5)(x^2 - 1)$ using the product rule.
19. Differentiate $f(x) = (3x + 4)(x^3 + 2x)$ using the product rule.
20. Differentiate $f(x) = (-x + 2)(x^2 + 4x + 5)$ using the product rule.

Hard Questions

21. Differentiate $f(x) = (x^2 + 3x + 2)(2x^2 - x + 5)$ using the product rule and simplify your answer.
22. Differentiate $f(x) = (3x^2 - x + 4)(2x^3 + x^2 - 1)$ using the product rule and simplify the result.
23. Differentiate $f(x) = (x^2 - 1)(x^2 + 1)(x + 2)$ by applying the product rule repeatedly and simplify your answer.
24. Differentiate $f(x) = (x - 3)(x + 4)(x + 1)$ using repeated application of the product rule and simplify your answer.
25. Differentiate $f(x) = (2x + 1)(x^3 - 3x^2 + 2x)$ using the product rule and present a simplified derivative.
26. Differentiate $f(x) = (x^2 + 2)(3x^3 - x)$ using the product rule and simplify your answer completely.
27. Differentiate $f(x) = (4x - 5)(x^4 + 2x^3 - x + 3)$ using the product rule and simplify your answer.
28. Differentiate $f(x) = (5x^2 - 4x + 1)(x^3 + 3)$ using the product rule and then simplify your answer fully.
29. Using the product rule, differentiate $f(x) = (x^2 - 2x + 1)(2x^2 + 5x + 3)$ and simplify your result.
30. Differentiate $f(x) = (x^3 - x)(x^3 + x^2 - 1)$ using the product rule and simplify your answer.