The Product Rule - maths

Accelerated Mathematics (Curtin University)

WORKSHEET

The product rule

1 Differentiate the following using the product rule. Expand and simplify your answer.

a $3x(x + 4)$

b $x^2(2x - 1)$

c $7x(2x^2 - 7)$

d $10x(x^3 + 5x^2)$

e $3x^2(5x^4 + 9x)$

f $5x^2(x^3 - 6x^2 + 1)$

g $2x^4(7x^4 + 5x^3 - 12)$

h $(x^2 + 5x + 6)(4x - 1)$

2 Given $f(x) = (x^2 - 2x)(3x - 5)$, find:

a $f(2)$

b $f(-1)$

c $f'(0)$

d $f'(3)$

e $f'(2)$

f $f'(-2)$

3 Differentiate the following (do not expand answers).

a $(3x^2 + 7x)(5x^3 + 8)$

b $(7x^8 - 3)(4x^2 - 9x^5)$

c $(2x + 6x^7)(3x^3 - 4x + 5x^7)$

d $(9x^2 - 7x^3 + 11)(3x^3 + 5x^2)$

e $(x^3 + 2x^2 - 5)(2x + 3x^2 + 7)$

f $(7x^4 - 2)(4x^3 + 5x^2 - 7x + 1)$

g $(8x^2 + 9x)(3 + 5x^3 - 2x)$

h $(4x^3 - 17x + 3)(7 - 6x^5)$

i $(5 + 2x^9)(3x^5 - 4x + 7)$

j $(6x^4 - 4x^2 + 3x)(8x + 2x^5)$

k $(2x^2 + 7x - 5)(3x^2 - 4x + 1)$

l $(9x^5 - 3x^2 + 4)(5x^4 + 2x^3 - 7)$

m $(4x^3 + 2x^2 - 5x + 8)(7x^4 - 11)$

Answers

1 **a** $6x + 12$

b $6x^2 - 2x$

c $42x^2 - 49$

d $40x^3 + 150x^2$

e $90x^5 + 81x^2$

f $25x^4 - 120x^3 + 10x$

g $112x^7 + 70x^6 - 96x^3$

h $12x^2 + 38x + 19$

2 **a** 0

b -24

c 10

d 25

e 2

f 90

3 **a** $(6x + 7)(5x^3 + 8) + 15x^2(3x^2 + 7x)$

b $56x^7(4x^2 - 9x^5) + (7x^8 - 3)(8x - 45x^4)$

c $(2 + 42x^6)(3x^3 - 4x + 5x^7) + (2x + 6x^7)(9x^2 - 4 + 35x^6)$

d $(18x - 21x^2)(3x^3 + 5x^2) + (9x^2 - 7x^3 + 11)(9x^2 + 10x)$

e $(3x^2 + 4x)(2x + 3x^2 + 7) + (x^3 + 2x^2 - 5)(2 + 6x)$

f $28x^3(4x^3 + 5x^2 - 7x + 1) + (7x^4 - 2)(12x^2 + 10x - 7)$

g $(16x + 9)(3 + 5x^3 - 2x) + (8x^2 + 9x)(15x^2 - 2)$

h $(12x^2 - 17)(7 - 6x^5) - 30x^4(4x^3 - 17x + 3)$

i $18x^8(3x^5 - 4x + 7) + (5 + 2x^9)(15x^4 - 4)$

j $(24x^3 - 8x + 3)(8x + 2x^5) + (6x^4 - 4x^2 + 3x)(8 + 10x^4)$

k $(4x + 7)(3x^2 - 4x + 1) + (2x^2 + 7x - 5)(6x - 4)$

l $(45x^4 - 6x)(5x^4 + 2x^3 - 7) + (9x^5 - 3x^2 + 4)(20x^3 + 6x^2)$

m $(12x^2 + 4x - 5)(7x^4 - 11) + 28x^3(4x^3 + 2x^2 - 5x + 8)$