

Dérivées 1 (réponses développées et réduites).

$$(k)' = 0 \text{ avec } k \in \mathbb{R}$$

$$(k \cdot u)' = k \cdot u' \text{ avec } k \in \mathbb{R}$$

$$(u + v)' = u' + v'$$

$$(x^n)' = n \cdot x^{n-1}$$

a) $(x^5)' = 5x^4$

b) $(-3)' = 0$

c) $(x)' = 1$

d) $(3x^6)' = 18x^5$

e) $(-9x^4)' = -36x^3$

f) $(x^4 + x^7)' = 4x^3 + 7x^6$

g) $(x^2 - x - 1)' = 2x - 1$

h) $(6x^3 + 2x^2 + x + 1)' = 18x^2 + 4x + 1$

i) $(2x^4 - 8x^3)' = 8x^3 - 24x^2$

j) $(3(x^2 + x))' = 3(2x + 1)$

k) $((x + 3)(x - 5))' = (x^2 - 2x - 15)' = 2x - 2$

l) $\left(\frac{1}{3}x^3 - \frac{3}{2}x^2 + \frac{1}{4}x + \frac{9}{7}\right)' = x^2 - 3x + \frac{1}{4}$

m) $\left(\frac{x^2 - 4x^4}{3}\right)' = \frac{1}{3}(x^2 - 4x^4)' = \frac{1}{3}(2x - 16x^3)$

n) $\left(\frac{x^4}{16} + \frac{3x^2}{4} + \frac{x}{2}\right)' = \frac{1}{4}x^3 + \frac{3}{2}x + \frac{1}{2}$

o) $\left(\frac{-2x^3}{3} - \frac{x^5}{15}\right)' = -2x^2 - \frac{1}{3}x^4$

Dérivées 2 (réponses factorisées).

$$(u^n)' = n \cdot u^{n-1} \cdot u' \text{ avec } n \in \mathbb{R}$$

a) $((x-3)^4)' = 4(x-3)^3$	$u = x-3$ $u' = 1$	$n = 4$ $n-1 = 3$
b) $((3-x)^5)' = 5(3-x)^4 \cdot (-1)$ $= -5(3-x)^4$	$u = 3-x$ $u' = -1$	$n = 5$ $n-1 = 4$
c) $((2x+1)^2)' = 2(2x+1) \cdot 2$ $= 4(2x+1)$	$u = 2x+1$ $u' = 2$	$n = 2$ $n-1 = 1$
d) $((x^2-x+1)^3)' = 3(x^2-x+1)(2x-1)$	$u = x^2-x+1$ $u' = 2x-1$	$n = 3$ $n-1 = 2$
e) $((x^2-4)^2)' = 2(x^2-4) \cdot 2x$ $= 4x(x^2-4)$ $= 4x(x+2)(x-2)$	$u = x^2-4$ $u' = 2x$	$n = 2$ $n-1 = 1$
f) $((9-4x^2)^2)' = 2(9-4x^2) \cdot (-8x)$ $= -16(9-4x^2)$ $= -16(3+2x)(3-2x)$	$u = 9-4x^2$ $u' = -8x$	$n = 2$ $n-1 =$
g) $((x^2-81)^5)' = 5(x^2-81)^4 \cdot 2x$ $= 10x(x^2-81)^4$ $= 10x(x+9)^4(x-9)^4$	$u = x^2-81$ $u' = 2x$	$n = 5$ $n-1 = 4$
h) $((x^2-2x)^3)' = 3(x^2-2x)^2 \cdot (2x-2)$ $= 3(x(x-2))^2 \cdot 2(x-1)$ $= 6x^2(x-2)^2(x-1)$	$u = x^2-2x$ $u' = 2x-2$	$n = 3$ $n-1 = 2$

Dérivées 3 (réponses factorisées).

$$(u \cdot v)' = u' \cdot v + u \cdot v'$$

a) $((2x+1)(3x-2))' = 2(3x-2) + 3(2x+1)$ $= 6x-4+6x+3$ $= 12x-1$	$u = 2x+1$ $u' = 2$	$v = 3x-2$ $v' = 3$
b) $(x(x^2+1)^2)' = (x^2+1)^2 + 4x^2(x^2+1)$ $= (x^2+1)[x^2+1+4x^2]$ $= (x^2+1)(5x^2+1)$	$u = x$ $u' = 1$	$v = (x^2+1)^2$ $v' = 2(x^2+1) \cdot 2x$ $= 4x(x^2+1)$
c) $((x+3)(x-1)^3)' = (x-1)^3 + 3(x+3)(x-1)^2$ $= (x-1)^2[x-1+3(x+3)]$ $= (x-1)^2(x-1+3x+9)$ $= (x-1)^2(4x+8)$ $= 4(x-1)^2(x+2)$	$u = x+3$ $u' = 1$	$v = (x-1)^3$ $v' = 3(x-1)^2$
d) $(x^4(2-3x)^2)' = 4x^3(2-3x)^2 - 6x^4(2-3x)$ $= 2x^3(2-3x)[2(2-3x)-3x]$ $= 2x^3(2-3x)(4-6x-3x)$ $= 2x^3(2-3x)(4-9x)$	$u = x^4$ $u' = 4x^3$	$v = (2-3x)^2$ $v' = 2(2-3x) \cdot (-3)$ $= -6(2-3x)$
e) $((x-1)^2(2x+1)^3)' =$ $= 2(x-1)(2x+1)^3 + 6(x-1)^2(2x+1)^2$ $= 2(x-1)(2x+1)^2[(2x+1)+3(x-1)]$ $= 2(x-1)(2x+1)^2(2x+1+3x-3)$ $= 2(x-1)(2x+1)^2(5x-2)$	$u = (x-1)^2$ $u' = 2(x-1)$	$v = (2x+1)^3$ $v' = 3(2x+1)^2 \cdot 2$ $= 6(2x+1)^2$
f) $((x-3)^3(x^2-4)^2)' =$ $= 3(x-3)^2(x^2-4)^2 + 4x(x-3)^3(x^2-4)$ $= (x-3)^2(x^2-4)[3(x^2-4) + 4x(x-3)]$ $= (x-3)^2(x^2-4)(3x^2-12+4x^2-12x)$ $= (x-3)^2(x^2-4)(7x^2-12x-12)$ $= (x-3)^2(x+2)(x-2)(7x^2-12x-12)$	$u = (x-3)^3$ $u' = 3(x-3)^2$	$v = (x^2-4)^2$ $v' = 2(x^2-4) \cdot 2x$ $= 4x(x^2-4)$

Dérivées 4 (réponses factorisées).

$$\left(\frac{u}{v}\right)' = \frac{u' \cdot v - u \cdot v'}{v^2}$$

$\begin{aligned} \text{a) } \left(\frac{x+1}{x-2}\right)' &= \frac{(x-2) - (x+1)}{(x-2)^2} \\ &= \frac{x-2-x-1}{(x-2)^2} \\ &= \frac{-3}{(x-2)^2} \end{aligned}$	$\begin{aligned} u &= x+1 & v &= x-2 \\ u' &= 1 & v' &= 1 \end{aligned}$
$\begin{aligned} \text{b) } \left(\frac{2x-5}{5x+3}\right)' &= \frac{2(5x+3) - 5(2x-5)}{(5x+3)^2} \\ &= \frac{10x+6-10x+25}{(5x+3)^2} \\ &= \frac{31}{(5x+3)^2} \end{aligned}$	$\begin{aligned} u &= 2x-5 & v &= 5x+3 \\ u' &= 2 & v' &= 5 \end{aligned}$
$\begin{aligned} \text{c) } \left(\frac{x^2}{x+2}\right)' &= \frac{2x(x+2) - x^2}{(x+2)^2} \\ &= \frac{x[2(x+2) - x]}{(x+2)^2} \\ &= \frac{x(2x+4-x)}{(x+2)^2} = \frac{x(x+4)}{(x+2)^2} \end{aligned}$	$\begin{aligned} u &= x^2 & v &= x+2 \\ u' &= 2x & v' &= 1 \end{aligned}$
$\begin{aligned} \text{d) } \left(\frac{2x-1}{x^3}\right)' &= \frac{2x^3 - 3x^2(2x-1)}{x^6} \\ &= \frac{x^2[2x-3(2x-1)]}{x^6} \\ &= \frac{(2x-6x+3)}{x^4} = \frac{-4x+3}{x^4} \end{aligned}$	$\begin{aligned} u &= 2x-1 & v &= x^3 \\ u' &= 2 & v' &= 3x^2 \end{aligned}$
$\begin{aligned} \text{e) } \left(\frac{1}{x^2-16}\right)' &= -\frac{2x}{(x^2-16)^2} \\ &= -\frac{2x}{(x+4)^2(x-4)^2} \end{aligned}$	$\begin{aligned} u &= 1 & v &= x^2-16 \\ u' &= 0 & v' &= 2x \end{aligned}$

$\begin{aligned} \text{f) } \left(\frac{x^2 - 13x + 40}{x - 4} \right)' &= \frac{(2x - 13)(x - 4) - (x^2 - 13x + 40)}{(x - 4)^2} \\ &= \frac{2x^2 - 8x - 13x + 52 - x^2 + 13x - 40}{(x - 4)^2} \\ &= \frac{x^2 - 8x + 12}{(x - 4)^2} = \frac{(x - 6)(x - 2)}{(x - 4)^2} \end{aligned}$	$\begin{aligned} u &= x^2 - 13x + 40 & v &= x - 4 \\ u' &= 2x - 13 & v' &= 1 \end{aligned}$
$\begin{aligned} \text{g) } \left(\frac{x^2 - 3x}{x + 1} \right)' &= \frac{(2x - 3)(x + 1) - (x^2 - 3x)}{(x + 1)^2} \\ &= \frac{2x^2 + 2x - 3x - 3 - x^2 + 3x}{(x + 1)^2} \\ &= \frac{x^2 + 2x - 3}{(x + 1)^2} = \frac{(x + 3)(x - 1)}{(x + 1)^2} \end{aligned}$	$\begin{aligned} u &= x^2 - 3x & v &= x + 1 \\ u' &= 2x - 3 & v' &= 1 \end{aligned}$
$\begin{aligned} \text{h) } \left(\frac{3x - 1}{(x - 4)^2} \right)' &= \frac{3(x - 4)^2 - 2(x - 4)(3x - 1)}{(x - 4)^4} \\ &= \frac{\cancel{(x - 4)} [3(x - 4) - 2(3x - 1)]}{(x - 4)^{4-3}} \\ &= \frac{3x - 12 - 6x + 2}{(x - 4)^3} = \frac{-3x - 10}{(x - 4)^3} \end{aligned}$	$\begin{aligned} u &= 3x - 1 & v &= (x - 4)^2 \\ u' &= 3 & v' &= 2(x - 4) \cdot 1 \end{aligned}$
$\begin{aligned} \text{i) } \left(\frac{(x + 2)^2}{(x - 2)^3} \right)' &= \frac{2(x + 2)(x - 2)^3 - 3(x + 2)^2(x - 2)^2}{(x - 2)^6} \\ &= \frac{(x + 2)\cancel{(x - 2)}^2 [2(x - 2) - 3(x + 2)]}{(x - 2)^{6-4}} \\ &= \frac{(x + 2)(2x - 4 - 3x - 6)}{(x - 2)^4} \\ &= \frac{(x + 2)(-x - 10)}{(x - 2)^4} \end{aligned}$	$\begin{aligned} u &= (x + 2)^2 & v &= (x - 2)^3 \\ u' &= 2(x + 2) \cdot 1 & v' &= 3(x - 2)^2 \cdot 1 \end{aligned}$
$\begin{aligned} \text{j) } \left(\frac{(1 - x)^3}{x + 5} \right)' &= \frac{-3(1 - x)^2(x + 5) - (1 - x)^3}{(x + 5)^2} \\ &= \frac{(1 - x)^2 [-3(x + 5) - (1 - x)]}{(x + 5)^2} \\ &= \frac{(1 - x)^2 (-3x - 15 - 1 + x)}{(x + 5)^2} \\ &= \frac{(1 - x)^2 (-2x - 16)}{(x + 5)^2} = \frac{-2(1 - x)^2(x + 8)}{(x + 5)^2} \end{aligned}$	$\begin{aligned} u &= (1 - x)^3 & v &= x + 5 \\ u' &= 3(1 - x)^2 \cdot (-1) & v' &= 1 \\ &= -3(1 - x)^2 \end{aligned}$

Dérivées 1 (réponses)

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|------------|---------------------|-----------------------------|--|
| a) $5x^4$ | e) $-36x^3$ | i) $8x^3 - 24x^2$ | m) $-\frac{16}{3}x^3 + \frac{2}{3}x$ |
| b) 0 | f) $4x^3 + 7x^6$ | j) $3(2x + 1) = 6x + 3$ | n) $\frac{1}{4}x^3 + \frac{3}{2}x + \frac{1}{2}$ |
| c) 1 | g) $2x - 1$ | k) $2x - 2$ | o) $-2x^2 - \frac{1}{3}x^4$ |
| d) $18x^5$ | h) $18x^2 + 4x + 1$ | l) $x^2 - 3x + \frac{1}{4}$ | |
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Dérivées 2 (réponses)

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|------------------|-------------------------------|--------------------------|----------------------------|
| a) $4(x - 3)^3$ | c) $4(2x + 1)$ | e) $4x(x + 2)(x - 2)$ | g) $10x(x + 9)^4(x - 9)^4$ |
| b) $-5(3 - x)^4$ | d) $3(x^2 - x + 1)^2(2x - 1)$ | f) $16x(2x + 3)(2x - 3)$ | h) $6x^2(x - 2)^2(x - 1)$ |
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Dérivées 3 (réponses)

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|--------------------------|---------------------------|---|
| a) $12x - 1$ | c) $4(x - 1)^2(x + 2)$ | e) $2(x - 1)(2x + 1)^2(5x - 2)$ |
| b) $(x^2 + 1)(5x^2 + 1)$ | d) $2x^3(2 - 3x)(4 - 9x)$ | f) $(x - 3)^2(x + 2)(x - 2)(7x^2 - 12x - 12)$ |
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Dérivées 4 (réponses)

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|---------------------------------|---------------------------------------|---------------------------------------|---|
| a) $\frac{-3}{(x - 2)^2}$ | d) $\frac{-4x + 3}{x^4}$ | g) $\frac{(x + 3)(x - 1)}{(x + 1)^2}$ | i) $-\frac{(x + 2)(x + 10)}{(x - 2)^4}$ |
| b) $\frac{31}{(5x + 3)^2}$ | e) $\frac{-2x}{(x + 4)^2(x - 4)^2}$ | | j) $\frac{-2(1 - x)^2(x + 8)}{(x + 5)^2}$ |
| c) $\frac{x(x + 4)}{(x + 2)^2}$ | f) $\frac{(x - 6)(x - 2)}{(x - 4)^2}$ | h) $\frac{-3x - 10}{(x - 4)^3}$ | |
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Révision 1 (réponses)

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|---------------------------------|---------------------------------------|---|
| a) $9x^2 + 4x + 1$ | f) $15(3x - 4)^4$ | k) $\frac{x(x + 4)}{(x + 2)^2}$ |
| b) $x^4 - 2x^3 + 2x^2 - 2x + 1$ | g) $6(x + 5)^2(x - 1)^2(x + 2)$ | l) $-5x^2(x - 3)(x - 5)$ |
| c) $\frac{x}{8} - \frac{5}{4}$ | h) $\frac{-3}{(x - 9)^4}$ | m) $2(2x + 3)^2(x - 2)(5x - 3)$ |
| d) $\frac{15x^2 + 9}{2}$ | i) $\frac{-1}{(2x - 1)^2}$ | n) $\frac{2(x + 3)^2(x - 3)^2(2x^2 - 6x + 9)}{(x - 2)^3}$ |
| e) $\frac{5}{x^6}$ | j) $\frac{(x + 3)(x - 1)}{(x + 1)^2}$ | |
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Révision 2 (réponses)

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|---------------------------------------|-----------------------------------|--|
| a) 0 | e) $\frac{4(1 - x)}{(x + 1)^3}$ | h) $\frac{-32x}{(2x + 1)^5(2x - 1)^5}$ |
| b) $x^2 - \frac{5}{3}x + \frac{2}{3}$ | f) $(x + 2)^2(8x - 17)$ | i) $\frac{4x^3(x + 3)}{(2x + 3)^3}$ |
| c) $\frac{-9}{2x^4}$ | g) $\frac{-12(x - 7)}{(3 - x)^3}$ | j) $\frac{-9(2x - 5)^2}{(1 - x)^4}$ |
| d) $-6x(x + 4)^2(4 - x)^2$ | | |
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