Calculer les dérivées des fonctions suivantes.

1. $f(x) = \dfrac{3}{2}$ $\qquad f'(x) = 0$ $\qquad (k)' = 0$

2. $f(x) = \dfrac{3x}{2} = \dfrac{3}{2}x$ $\qquad f'(x) = \dfrac{3}{2}$ $\qquad (kx)' = k$

3. $f(x) = 3x^2$ $\qquad f'(x) = 3 \cdot 2x = 6x$

4. $f(x) = 3x + \sqrt{x}$ $\qquad f'(x) = 3 + \dfrac{1}{2\sqrt{x}} = \dfrac{3 \cdot 2\sqrt{x}}{2\sqrt{x}} + \dfrac{1}{2\sqrt{x}} = \dfrac{6\sqrt{x}+1}{2\sqrt{x}} = \dfrac{6\sqrt{x}+1}{2\sqrt{x}} \cdot \dfrac{\sqrt{x}}{\sqrt{x}}$
$= \dfrac{6x+\sqrt{x}}{2x}$

5. $f(x) = \underset{u}{3x}\,\underset{v}{\sqrt{x}}$ $\qquad f'(x) = \underset{u' \cdot v}{3\sqrt{x}} + \underset{u \cdot v'}{3x \cdot \dfrac{1}{2\sqrt{x}}} = 3\sqrt{x} + \dfrac{3x}{2\sqrt{x}}$

$u = 3x \quad v = \sqrt{x}$
$u' = 3 \quad v' = \dfrac{1}{2\sqrt{x}}$

$= \dfrac{3\sqrt{x} \cdot 2\sqrt{x} + 3x}{2\sqrt{x}} = \dfrac{6x + 3x}{2\sqrt{x}} = \dfrac{9x}{2\sqrt{x}} = \dfrac{9x\sqrt{x}}{2\sqrt{x}\sqrt{x}} = \dfrac{9\sqrt{x}}{2}$

6. $f(x) = \dfrac{2}{x^3+1}$ $\qquad f'(x) = 2 \cdot \left(\underset{\frac{1}{v}}{\dfrac{1}{x^3+1}}\right)' = 2 \cdot \left(\underset{-\frac{v'}{v^2}}{-\dfrac{3x^2}{(x^3+1)^2}}\right) = -\dfrac{6x^2}{(x^3+1)^2}$

$v = x^3+1$
$v' = 3x^2$

7. $f(x) = \dfrac{x^3+1}{2}$ $\qquad f'(x) = \dfrac{1}{2}\left(x^3+1\right)' = \dfrac{1}{2} \cdot 3x^2 = \dfrac{3x^2}{2}$

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

$u = x-1 \quad v = x^3+1$
$u' = 1 \quad v' = 3x^2$

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

Variante pour 5.

$f'(x) = (3x\sqrt{x})' = (3x \cdot x^{1/2})' = 3\left(x^{3/2}\right)' = 3 \cdot \dfrac{3}{2} x^{\frac{3}{2}-1} = \dfrac{9}{2} x^{1/2} = \dfrac{9\sqrt{x}}{2}$