1. $f(x) = \dfrac{1}{x^3 - 4}$

2. $g(x) = \dfrac{1}{1 - x}$

3. $h(x) = \dfrac{1}{-x^2 + 5x + 7}$

$\left(\frac{1}{u}\right)' = \frac{-u'}{u^2}$

1) $g(x) = \dfrac{1}{x^3 - 4}$ u

$\rightarrow u' = 3x^2$

$g'(x) = -\dfrac{3x^2}{(x^3 - 4)^2}$

2) $g(x) = \dfrac{1}{1-x}$ u

$\hookrightarrow u' = -1 \times 1 = -1$

$$g'(x) = \frac{-(-1)}{(1-x)^2} = \frac{1}{(1-x)^2}.$$

3) $h(x) = \dfrac{1}{-x^2+5x+7}$ u

$\hookrightarrow u' = -1 \times 2x + 5 \times 1 = \underline{-2x+5}$

$$h'(x) = \frac{-(-2x+5)}{(-x^2+5x+7)^2}$$

$$= \frac{2x-5}{(-x^2+5x+7)^2}$$

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

$\left(\dfrac{u}{v}\right)' = \dfrac{u'v - uv'}{v^2}$

2. $g(x) = \dfrac{2\sqrt{x}}{x^2 - 4}$

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

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

$u \to u' = 3x^2$

$v \to v' = \dfrac{1}{2\sqrt{x}}$

$\forall x \in \mathbb{R}_+^*$

$$f'(x) = \frac{3x^2 \times \sqrt{x} - x^3 \times \frac{1}{2\sqrt{x}}}{(\sqrt{x})^2}$$

$$= \frac{3x^2\sqrt{x} - \frac{x^3}{2\sqrt{x}}}{x}$$

2) $g(x) = \dfrac{2\sqrt{x}}{x^2-4}$

$\rightsquigarrow u' = 2 \times \frac{1}{2\sqrt{x}}$

$\rightsquigarrow v' = 2x$

$$g'(x) = \frac{\frac{1}{\sqrt{x}} \times (x^2-4) - 2\sqrt{x} \times 2x}{(x^2-4)^2}$$

$$= \frac{\frac{x^2-4}{\sqrt{x}} - 4x\sqrt{x}}{(x^2-4)^2}$$

$\forall x \in \mathbb{R} \setminus \{2\}$

3) $h(x) = \dfrac{x^2 + 1}{x^3 - 1}$ → $u' = 2x$; → $3x^2$

$$h'(x) = \frac{2x(x^3 - 1) - (x^2 + 1) \times 3x^2}{(x^3 - 1)^2}$$

$$= \frac{2x^4 - 2x - 3x^4 - 3x^2}{(x^3 - 1)^2}$$

$$= \frac{-x^4 - 3x^2 - 2x}{(x^3 - 1)^2}$$

$\forall x \in \mathbb{R} \setminus \{1\}$

$$[g(mx+p)]'$$

$$\hookrightarrow m \times g'(mx+p)$$

$$g(x) = \sqrt{2-5x}$$

$$g'(x) = -5 \times \frac{1}{2\sqrt{2-5x}}$$

$$g(x) = (2x+3)^2$$

$$g'(x) = 2 \times 2(2x+3)$$

$$(\sqrt{x})' = \frac{1}{2\sqrt{x}} \qquad (\sqrt{mx+p})' = \frac{m}{2\sqrt{mx+p}}$$

$$\left(\frac{1}{x}\right)' = -\frac{1}{x^2} \qquad \left(\frac{1}{mx+p}\right)' = -\frac{m}{(mx+p)^2}$$

$$(x^2)' = 2x \qquad (mx+p)^2 = mx2(mx+p)$$

$$(x^3)' = 3x^2 \qquad (mx+p)^3 = mx3(mx+p)^2$$

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

$$\left(\frac{1}{x^n}\right)' = \frac{-n}{x^{n+1}}$$

$$(mx+p)^n \longrightarrow m \times n\,(mx+p)^{n-1}$$

$$\frac{1}{(mx+p)^n} \longrightarrow \frac{-m \times n}{(mx+p)^{n+1}}$$

$$g(x) = \frac{2}{(-5x+2)^3}$$

$$g'(x) = 2 \times \frac{-(-5) \times 3}{(-5x+2)^4}$$

$$= \frac{2 \times 5 \times 3}{(-5x+2)^4} = \frac{30}{(-5x+2)^4}.$$