

Exercise 1

① $f(x) = x^6 - 3x^5 + 4x - 8$
 $f'(x) = 6x^5 - 15x^4 + 4$

② $f(x) = \frac{1}{2x^3 + x^2 + 7}$ $\left(\frac{1}{u}\right)' = -\frac{u'}{u^2}$

Donc $f'(x) = \frac{-6x^2 - 2x}{(2x^3 + x^2 + 7)^2}$

③ $f(x) = \frac{-5x + 2}{x + 4}$ $\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2}$

Donc $f'(x) = \frac{-5(x+4) - (-5x+2) \cdot 1}{(x+4)^2} = \frac{-5x - 20 + 5x - 2}{(x+4)^2} = \frac{-22}{(x+4)^2}$

④ $f(x) = (x^7 - 2x)\sqrt{x}$ $(uv)' = u'v + uv'$

Donc $f'(x) = (7x^6 - 2)\sqrt{x} + (x^7 - 2x) \cdot \frac{1}{2\sqrt{x}} = 7x^6\sqrt{x} - 2\sqrt{x} + \frac{x^7}{2\sqrt{x}} - \sqrt{x}$
 $= 7x^6\sqrt{x} + \frac{x^6\sqrt{x}}{2} - 3\sqrt{x}$
 $= \frac{15}{2}x^6\sqrt{x} - 3\sqrt{x} = \left(\frac{15}{2}x^6 - 3\right)\sqrt{x}$

⑤ $f(x) = (x^2 + 5x + 3)^2$ $(u^2)' = 2u'u$

Donc $f'(x) = 2(2x + 5)(x^2 + 5x + 3) = (4x + 10)(x^2 + 5x + 3)$

⑥ $f(x) = (x^5 + 1)^3$ $(u^n)' = n u' u^{n-1}$

Donc $f'(x) = 3 \cdot 5x^4 \cdot (x^5 + 1)^2 = 15x^4 (x^5 + 1)^2$