

$$21) f(x) = \sqrt{\sqrt{x} + \frac{1}{x^2} - 4x + 12}.$$

$$h(x) = x^{\frac{1}{2}}.$$

$$g(x) = \left(x^{\frac{1}{2}} + x^{-2} - 4x + 12\right)$$

$$f(x) = h(g(x))$$

$$f'(x) = \frac{d}{dx} f(x) = h'(g(x)) \cdot g'(x) = n [g(x)]^{n-1} \cdot g'(x).$$

$$f'(x) = \frac{d}{dx} f(x) = \frac{d}{dx} \left(x^{\frac{1}{2}} + x^{-2} - 4x + 12\right)^{\frac{1}{2}}.$$

$$f'(x) \frac{1}{2} \left(x^{\frac{1}{2}} + x^{-2} - 4x + 12\right)^{-\frac{1}{2}} \cdot \left(\frac{1}{2}x^{-\frac{1}{2}} - 2x^{-3} - 4\right)$$

$$f'(x) = \frac{\frac{1}{2\sqrt{x}} - \frac{2}{x^3} - 4}{2\sqrt{\sqrt{x} + \frac{1}{x^2} - 4x + 12}}$$

$$(Q2) \quad y = 2u^2 - 3u + 1$$

$$u = x^3 - \sqrt{x}$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$\frac{dy}{du} = 4u - 3$$

$$\frac{du}{dx} = 3x^2 - \frac{1}{2} \cdot x^{-\frac{1}{2}}$$

$$= 3x^2 - \frac{1}{2\sqrt{x}}$$

$$\frac{dy}{dx} = 4u - 3 \left(3x^2 - \frac{1}{2\sqrt{x}} \right)$$

$$= 4(x^3 - \sqrt{x}) - 3 \left[3x^2 - \frac{1}{2\sqrt{x}} \right]$$

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

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

① 3)

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

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

$$f'(x) = \left[3 \cdot \left(\frac{2x^2 + 3x}{x^2 - 1} \right)^2 \right] \cdot \frac{d}{dx} \left(\frac{2x^2 + 3x}{x^2 - 1} \right)$$

$$f'(x) = 3 \left(\frac{2x^2 + 3x}{x^2 - 1} \right)^2 \left[\frac{(x^2 - 1) \cdot \frac{d}{dx}(2x^2 + 3x) - (2x^2 + 3x) \cdot \frac{d}{dx}(x^2 - 1)}{(x^2 - 1)^2} \right]$$

$$f'(x) = 3 \left(\frac{2x^2 + 3x}{x^2 - 1} \right)^2 \left[\frac{(x^2 - 1) \cdot (4x + 3) - (2x^2 + 3x) \cdot (2x)}{(x^2 - 1)^2} \right]$$

$$f'(x) = 3 \left(\frac{2x^2 + 3x}{x^2 - 1} \right)^2 \left[\frac{(4x^3 + 3x^2 - 4x^3 - 6x^2)}{(x^2 - 1)^2} \right]$$

$$f'(x) = 3 \left(\frac{2x^2 + 3x}{x^2 - 1} \right)^2 \left[\frac{-3x^2 - 4x - 3}{(x^2 - 1)^2} \right]$$