

(1) [3 points] Differentiate:  $y = \frac{x^4 - 2x + 5}{\sqrt{x}} = x^{\frac{7}{2}} - 2x^{\frac{1}{2}} + 5x^{-\frac{1}{2}}$

$$\therefore y' = \frac{7}{2}x^{\frac{5}{2}} - x^{-\frac{1}{2}} - \frac{5}{2}x^{-\frac{3}{2}}$$

(2) [4 points] Differentiate:  $y = \frac{\cos x}{x^3}$

$$y' = \frac{x^3(-\sin x) - (\cos x)3x^2}{(x^3)^2}$$
$$= \frac{-x^3 \sin x - 3x^2 \cos x}{x^6}$$

(3) [4 points] Determine  $\frac{dy}{dx}$ :  $y = (5x - 2)^4(7x^2 + 3)^{-2}$

$$\begin{aligned}\frac{dy}{dx} &= 4(5x-2)^3(5)(7x^2+3)^{-2} + (5x-2)^4(-2)(7x^2+3)^{-3}(14x) \\ &= 20(5x-2)^3(7x^2+3)^{-2} - 28x(5x-2)^4(7x^2+3)^{-3}\end{aligned}$$

(4) [4 points] Find  $f'(x)$ :  $f(x) = \sin(x^3 \tan x)$

$$f'(x) = \cos(x^3 \tan x) \left[ 3x^2 \tan x + x^3 \sec^2 x \right]$$