

$$\textcircled{1} f'(x) = 12 \left[1 + \cot^3(x^5) \right]^{11} \cdot 3 \cot^2(x^5) \cdot (-\csc^2(x^5)) \cdot 5x^4$$

$$\textcircled{2} g'(x) = \frac{1}{2} (3x - \sin^2(4x))^{-1/2} \cdot [3 - 2 \sin(4x) \cos(4x) \cdot 4]$$

$$\textcircled{3} h'(x) = \sec(5x^2 - 2) \sec^2(6x^3 + x) (18x^2 + 1) + \tan(6x^3 + x) \sec(5x^2 - 2) \tan(5x^2 - 2) \cdot 10x$$

$$\textcircled{4} p'(x) = 17 \left(\frac{1+x^2}{x-x^2} \right)^{16} \cdot \left[\frac{(x-x^2)(2x) - (1+x^2)(1-2x)}{(x-x^2)^2} \right]$$

$$\textcircled{5} j'(x) = 5 \left[x \sin 2x + \tan^4(x^7) \right]^4 \cdot \left[x \cos 2x \cdot 2 + \sin 2x + 4 \tan^3(x^7) \cdot \sec^2(x^7) \cdot 7x^6 \right]$$

$$\textcircled{6} \frac{dy}{dx} = \frac{(x+1)^2 - 2x}{(x+1)^2} \bigg|_{x=1/2} = \frac{\frac{3}{2} \cdot 2 - 1}{\left(\frac{3}{2}\right)^2} = \frac{2}{9/4} = \frac{8}{9}$$

$$y\left(\frac{1}{2}\right) = \frac{1}{3/2} = \frac{2}{3}$$

$$\boxed{y - \frac{2}{3} = \frac{8}{9} \left(x - \frac{1}{2}\right)}$$

$$\textcircled{7} \frac{dy}{dx} = 1 + 2 \cos x (-\sin x) = 1 - 2 \sin x \cos x \bigg|_{x=\pi/4} = 1 - 2 \sin\left(\frac{\pi}{4}\right) \cos\left(\frac{\pi}{4}\right)$$

$$= 1 - 2 \left(\frac{\sqrt{2}}{2}\right) \left(\frac{\sqrt{2}}{2}\right) = 0$$

$$y\left(\frac{\pi}{4}\right) = \frac{\pi}{4} + \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{\pi}{4} + \frac{1}{2}$$

$$\boxed{y = \frac{\pi}{4} + \frac{1}{2}}$$

$$y = \left(-\frac{2}{5}\right)x + \frac{13}{5}$$

$$\textcircled{8} \frac{dy}{dx} = x^2 - \frac{22}{5} = \frac{-2}{5}$$

$$x^2 = \frac{20}{5} = 4$$

$$x = \pm 2$$

$$y(2) = \frac{8}{3} - \frac{44}{5} = \frac{-92}{15}$$

$$y(-2) = \frac{-8}{3} + \frac{44}{5} = \frac{92}{15}$$

$$\boxed{\begin{matrix} (2, -\frac{92}{15}) \\ (-2, \frac{92}{15}) \end{matrix}}$$

$$\textcircled{10} f'(x) = \frac{1}{3} (g(h(x)) + p^4(x))^{-2/3} \cdot [g'(h(x)) \cdot h'(x) + 4p^3(x) \cdot p'(x)]$$

$$\textcircled{9} \frac{dy}{dx} = \frac{1}{2} [f(x)]^{1/2} \cdot f'(x)$$

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