REVIEW PRACTICE - SOLUTIONS

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

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

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

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

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

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

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

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

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

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

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

$y = \frac{-2}{5}x + \frac{13}{5}$

⑧ $\frac{dy}{dx} = x^2 - \frac{22}{5} = \frac{-2}{5}$ $\quad y(2) = \frac{8}{3} - \frac{44}{5} = \frac{-92}{15}$ $\quad \boxed{\left(2, \frac{-92}{15}\right)}$

$x^2 = \frac{20}{5} = 4$ $\quad y(-2) = \frac{-8}{3} + \frac{44}{5} = \frac{92}{15}$ $\quad \boxed{\left(-2, \frac{92}{15}\right)}$

$x = \pm 2$

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

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

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