Ch. 2

① $f(x)=(x^2-3)^4$ at $x=2 \Rightarrow (2,1)$

(a) $f'(x)=4(x^2-3)^3(2x)$

$f'(x)=8x(x^2-3)^3$

$f'(2)=16(1)^3=16$

$y-1=16(x-2)$

(b) $0=8x(x^2-3)^3$

$8x=0, \quad x^2-3=0$

$x=0 \quad x^2=3$

$x=\pm\sqrt{3}$

(c) $f'(x)=8x(x^2-3)^3$ $\quad u=8x$ $\quad v=(x^2-3)^3$

$u\,dv+v\,du$

$8x\cdot 3(x^2-3)^2(2x)+(x^2-3)^3(8)$

$f''(x)=48x^2(x^2-3)^2+8(x^2-3)^3$

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(2) $f(x) = \sqrt{4x-3}$ $\quad g(x) = \frac{f(x)}{x}$

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

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

$f'(3) = \frac{6}{3} = 2$

(b) $g(x) = \frac{f(x)}{x}$ $\quad f(3) = 3$

$g'(x) = \frac{x \cdot f'(x) - f(x) \cdot 1}{x^2}$ $\quad g(3) = \frac{3}{3} = 1$

$g'(3) = \frac{3 \cdot 2 - 3}{9}$ $\quad \frac{3}{9} = \frac{1}{3}$ $\quad (3, 1)$

$\boxed{y - 1 = \frac{1}{3}(x-3)}$

(c) $m_{\perp} = -3$

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(4)

(a) $h(x) = \frac{f(x)}{g(x)}$ $\quad u \quad v$

$h'(x) = \frac{v\,du - u\,dv}{v^2}$

$h'(x) = \frac{g(x)\cdot f'(x) - f(x)g'(x)}{[g(x)]^2}$

$h'(2) = \frac{g(2)\cdot f'(2) - f(2)\,g'(2)}{[g(2)]^2}$

$\frac{5\cdot 1 - (-3)(-2)}{5^2} = \frac{5-6}{25} = \boxed{\frac{-1}{25}}$

(b) $j(x) = f(g(x))$

$j'(x) = f'(g(x)\cdot g'(x)$

$j'(2) = f'(g(2)\cdot g'(2)$

$f'(5)\cdot(-2)$

$7\cdot -2 = \boxed{-14}$

(c) $k(x) = \sqrt{f(x)}$

$= f(x)^{1/2}$

$k'(x) = \frac{1}{2} f(x)^{-1/2}\cdot f'(x)$

$k'(5) = \frac{1}{2} f(5)^{-1/2}\cdot f'(5)$

$\frac{1}{2}(4)^{-1/2}\cdot 7$

$\frac{1}{2}\cdot\frac{1}{2}\cdot 7 = \boxed{\frac{7}{4}}$

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(6) (a) i (0, 1) (4.2, 5)
ii (2, 4.2)
iii (1, 2)

(b) i $t = 0.75$ sec
$\boxed{m = -2 \text{ m/s}^2}$

ii $t = 4.2$ sec
$\boxed{m = 5 \text{ m/s}^2}$

Ch 2

(7) $g(x) = f(x) \cdot \tan x + kx$ $\quad f(\frac{\pi}{4}) = 4$

(9) $\quad f'(\frac{\pi}{4}) = -2$

$g'(x) = f(x) \cdot \sec^2 x + f'(x) \tan x + k$

$g'(x)$ FAILS TO EXIST AT

$x = \frac{\pi}{2}$; $x = \frac{3\pi}{2}$ SINCE $\tan x$ & $\sec^2 x$ are UNDEFINE AT THESE POINTS

(D) $g'(\frac{\pi}{4}) = 6$

$6 = 4 \cdot \sec^2(\frac{\pi}{4}) + (-2)(\tan\frac{\pi}{4}) + k$

$6 = 4(2) + (-2)(1) + k$

$6 = 8 - 2 + k$

$0 = k$

(8) C

(9) B

(10) A