WS

5 part 5)

$h(x) = (f(x))^2$

$h'(x) = 2(f(x))^1 f'(x)$

$h'(2) = 2f(2)f'(2)$

$2(4)(-1)$

5 part 6)

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

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

$h'(6) = f'(g(6))\, g'(6)$

$f'(4)(-2)$

$(-1)(-2)$

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1.) $f(x) = \sqrt{1-x^3}$

2.) $f(x) = \tan 3x$

3.) $f(x) = \sin^4 x$

④ $y = \frac{7}{(2x+1)^4}$

⑤ $y = \tan^4 2x$

⑥ $y = x(3x-5)^4$

#1-5: simplify (no negative exponents)
#6: factor and simplify completely

1.) $f(x) = \sqrt{1-x^3}$

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

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

2.) $f(x) = \tan 3x$

$f'(x) = \sec^2 3x \cdot 3$

$= 3\sec^2 3x$

3.) $f(x) = \sin^4 x$

$f(x) = (\sin x)^4$

$f'(x) = 4(\sin x)^3 \cos x$

or

$4\sin^3 x \cos x$

(4) $y = \frac{7}{(2x+1)^4} = 7(2x+1)^{-4}$

$y' = -28(2x+1)^{-5} \cdot 2 = \frac{-56}{(2x+1)^5}$

(5) $y = \tan^4 2x$

$y' = 4(\tan 2x)^3 \sec^2 2x \cdot 2 = 8\tan^3 2x \sec^2 2x$

(6) $y = x(3x-5)^4$

$$y = (\tan 2x)^4$$

$$y' = 4(\tan 2x)^3 \sec^2 2x \cdot 2$$

$$y' = 8\tan^3 2x \sec^2 2x$$

6.) $y = x(3x-5)^4$

$y' = x \cdot 4(3x-5)^3 \cdot 3 + (3x-5)^4 \cdot 1$

$y' = 12x(3x-5)^3 + (3x-5)^4$

$= (3x-5)^3(12x + 3x - 5)$

$= (3x-5)^3(15x-5)$

$= 5(3x-5)^3(3x-1)$

$$\frac{x}{\sqrt{x^2+1}}$$

find $f'(c)$

7.) $f(x) = (9-x^2)^{2/3}$; $c = 1$

8.) $f(x) = \cos^2 3x$; $c = \frac{\pi}{4}$

9.) Write the equation of the tangent line at $x = \frac{\pi}{3}$ for $y = \tan 2x$

find $f'(c)$

7.) $f(x) = (9-x^2)^{2/3}$; $c = 1$

$f'(x) = \frac{2}{3}(9-x^2)^{-1/3}(-2x)$

$f'(1) = \frac{2}{3} \cdot 8^{-1/3}(-2) = -\frac{2}{3}$

8.) $f(x) = \cos^2 3x$; $c = \frac{\pi}{4}$

$f'(x) = 2\cos 3x(-\sin 3x) \cdot 3$

$f'\left(\frac{\pi}{4}\right) = 2\left(-\frac{\sqrt{2}}{2}\right)\left(-\frac{\sqrt{2}}{2}\right) \cdot 3$

$= 3$

9.) Write the equation of the tangent line at $x = \frac{\pi}{3}$ for $y = \tan 2x$ $\left(\frac{\pi}{3}, -\sqrt{3}\right)$

$y' = \sec^2 2x \cdot 2$

$y'\left(\frac{\pi}{3}\right) = (-2)^2 \cdot 2 = 8$

$\boxed{y + \sqrt{3} = 8\left(x - \frac{\pi}{3}\right)}$

$$y = \frac{x}{\sqrt{x^2+1}} = x(x^2+1)^{-1/2}$$

$$y' = x \cdot \frac{-1}{2}(x^2+1)^{-3/2} \cdot 2x + (x^2+1)^{-1/2} \cdot 1$$

$$= -x^2(x^2+1)^{-3/2} + (x^2+1)^{-1/2}$$

$$= (x^2+1)^{-3/2}(-x^2 + x^2 + 1)$$

$$= \frac{1}{(x^2+1)^{3/2}}$$

y' ; $\frac{dy}{dx}$

y'' ; $\frac{d^2y}{dx^2}$