9. 22. 金.
정수 1 과제

#2.6.1.(2)

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

$$f'(x) = \frac{x^4 - 3x^2 - 4 - x(4x^3 - 6x)}{((x^2-4)(x^2+1))^2}$$

$$= \frac{-3x^4 - 9x^2 - 4}{(x^2-4)^2 (x^2+1)^2}$$

$$\therefore f'(x) = \frac{-3x^4 - 9x^2 - 4}{(x^2-4)^2 (x^2+1)^2}$$

#2.6.2(2)

$$y' = \frac{-2x(2x+3) - (4-x^2)\cdot 2}{(2x+3)^2}$$

$$= \frac{-6x^2 - 6x + 8}{(2x+3)^2}$$

$x = 9$.

$$\frac{-6\cdot 81 - 6\cdot 9 + 8}{21^2}$$

$$= \frac{-486 - 54 + 8}{441}$$

$$= \frac{-540 + 8}{441}$$

$$= \frac{-532}{441} = \frac{76}{63}$$

$$\therefore -\frac{76}{63}$$

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#2.6.3.(9)

$f(x) = (x+1)^{-n}$

$f'(x) = -n(x+1)^{-n-1}$

$f'(0) = -n$

$y = -n(x-0) + 0$

$= -nx$.

$\therefore y = -nx$.

#2.6.4.(2)

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

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

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

$x=2$. $2 + \frac{12}{2} \cdot \frac{1}{3} = 4$.

#2.6.5.(2)

$f'(x) = \frac{\frac{1}{2}x^{-\frac{1}{2}}(x-1) - \sqrt{x}}{(x-1)^2} = \left(\frac{1}{2}\frac{1}{\sqrt{x}}(x-1) - \sqrt{x}\right)\frac{1}{(x-1)^2}$

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

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$$f'(x) = \frac{-x-1}{2\sqrt{x}\,(x-1)^2}$$

$$f''(x) = \frac{-2\sqrt{x}\,(x-1)^2 + (x+1)\left[2\cdot\frac{1}{2\sqrt{x}}(x-1)^2 + 2\sqrt{x}\cdot 2(x-1)\right]}{4x(x-1)^4}$$

$$= \frac{-2\sqrt{x}\,(x-1)^2 + (x+1)\left[\frac{1}{\sqrt{x}}(x-1)^2 + 4\sqrt{x}(x-1)\right]}{4x(x-1)^4}$$

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

$$= \frac{-2(x-1)^2 + (x+1)(5x^2-6x+1)}{4\sqrt{x}(x-1)^4}$$

$$= \frac{-2x^2+4x-2 + 5x^3-6x^2+x+5x^2-6x+1}{4\sqrt{x}(x-1)^4}$$

$$= \frac{5x^3-3x^2-x-1}{4\sqrt{x}(x-1)^4} \quad \therefore \frac{5x^3-3x^2-x-1}{4\sqrt{x}(x-1)^4}$$

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정석1 과제

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#2.7.1.(2)

$x^{\frac{1}{2}} + y^{\frac{1}{2}} = a^{\frac{1}{2}}$

$\frac{1}{2\sqrt{x}} + \frac{1}{2\sqrt{y}}\frac{dy}{dx} = 0.$

$\frac{1}{~~2~~\sqrt{y}}\frac{dy}{dx} = \frac{1}{-~~2~~\sqrt{x}}.$ $\therefore \frac{dy}{dx} = -\sqrt{\frac{y}{x}}$

#2.7.~~[illegible]~~2(5)

$y^2 = x^3 + x + 1.$

$2y \cdot \frac{dy}{dx} = 3x^2 + 1$ $\therefore \frac{dy}{dx} = \frac{3x^2+1}{2y}$

$2\frac{dy}{dx} + 2y \cdot \frac{d^2y}{dx^2} = 6x.$

$~~2~~ \cdot \frac{3x^2+1}{~~2~~y} + 2y\frac{d^2y}{dx^2} = 6x.$

$2y\frac{d^2y}{dx^2} = 6x - \frac{3x^2+1}{2y}$ $\therefore \frac{d^2y}{dx^2} = \frac{3x}{y} - \frac{3x^2+1}{2y^2}.$

#2.7.3.(1)

$x^3 + y^2 = 9.$

$3x^2 + 2y\,y' = 0.$

$y' = \frac{-3x^2}{2y}.$

$(2,1)$, $y' = \frac{-3 \cdot x^2}{x \cdot 1}$ $\therefore -6$.

#2.4.6 (1)

$x^2 - 2xy + 4y^2 = 12$

$2x - 2y - 2xy' + 8y \cdot y' = 0$.

$y' = 0$. $2x - 2y = 0$. $x = y$. $\therefore x = y$일 때.

(2)

$2x - 2y - 2xy' + 8yy' = 0$.

$y'(8y - 2x) = -(2x - 2y)$

$y' = \frac{-(2x-2y)}{-(2x-8y)}$.

$= \frac{x-y}{x-4y}$

$\frac{a-b}{a-4b} = \frac{c-d}{c-4d}$.

[illegible] $\therefore$ (a,b) (c,d)는

x좌표와 y좌표의 차이가 서로 같다

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#2.8.11)

$3 = x^3 + 1$

$9 = x^3 + 1 \quad \therefore x = 2. \quad (2, 3).$

$f'(x) = \frac{3x^2}{2\sqrt{x^3+1}}$

$(f^{-1}(y))' = \frac{2\sqrt{x^3+1}}{3x^2}.$

$(f^{-1}(3))' = \frac{2\sqrt{9}}{3 \cdot 9.} = \frac{1}{2} \quad \therefore \frac{1}{2}.$

A

$12 = x + \sqrt{x}$

$x - 12 = -\sqrt{x}$

$x^2 - 24x + 144 = x$

$x^2 - 25x + 144 = 0.$

$(x-9)(x-16) = 0 \quad \therefore x = 9 \text{ or } 16 \qquad (9, 12).$

$f'(x) = 1 + \frac{1}{2\sqrt{x}}.$

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

$(f^{-1}(12))' = \frac{1}{1 + \frac{1}{2 \cdot 3}} = \frac{6}{7}. \quad \therefore \frac{6}{7}.$

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#2.8.3

겉넓이 식. $V = \frac{\sqrt{2}}{2}x^3$.

$y = \frac{\sqrt{2}}{2}x^3$.

$\frac{dy}{dx} = \frac{\sqrt{2}}{4}x^2$ $\therefore \frac{dx}{dy} = \frac{4}{\sqrt{2}x^2}$.

#2.9. ~~예제~~ 1(4)

$4x^2 + 4xy + y^2 = x^2 - 4xy + 4y^2$

$\therefore 3x^2 - 8xy - 3y^2 = 0$.

$6x - 8y - 8x \cdot y' - 6y \cdot y' = 0$.

$(-8x - 6y)y' = -6x + 8y$.

$y' = \frac{-6x - 8y}{8x - 6y}$

$= \frac{3x - 4y}{4x - 3y}$. $\therefore \frac{3x - 4y}{4x - 3y}$.