11.18 土. 개념수2 과제

DATE.

#13.4.9 $f(a+h_1, b+h_2) \doteqdot f(a,b) + f_x(a,b)h_1 + f_y(a,b)h_2$

$f(2.2, 4.9) = f(2+0.2, 5-0.1)$

$\doteqdot f(2,5) + f_x(2,5)\cdot 0.2 + f_y(2,5)\cdot(-0.1)$

$= 6 + 1\cdot 0.2 + 1\cdot(+0.1) = 6.3$

#13.5.6(2) $u_x = u_r \cdot r_x + u_\theta \cdot \theta_x$

$u_r = 2r\sin 2\theta$

$u_\theta = 2r^2\cos 2\theta$

$r_x = \dfrac{2x}{2\sqrt{x^2+y^2}} = \dfrac{x}{\sqrt{x^2+y^2}}$

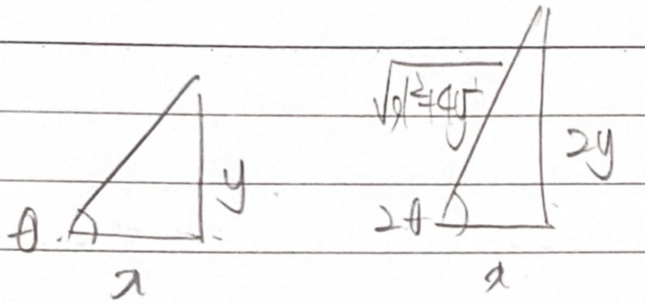
$r_y = \dfrac{y}{\sqrt{x^2+y^2}}$

$\theta_x = \dfrac{y \cdot \frac{-1}{x^2}}{1+\left(\frac{y}{x}\right)^2}$

$= \dfrac{\cancel{x^2}}{y^2+1} \cdot \dfrac{-y}{\cancel{x^2}} = \dfrac{-y}{y^2+1}$

$\theta_y = \dfrac{\frac{1}{x}}{1+\left(\frac{y}{x}\right)^2}$

$= \dfrac{x^2}{1+y^2} \cdot \dfrac{1}{x} = \dfrac{x}{1+y^2}$




$$\begin{cases} \cos 2\theta = \dfrac{x}{\sqrt{x^2+4y^2}} \\ \sin 2\theta = \dfrac{2y}{\sqrt{x^2+4y^2}} \end{cases}$$

$$u_x = u_r \cdot r_x + u_\theta \cdot \theta_x$$

$$= \cancel{2\sqrt{x^2+y^2}}\ \frac{2y}{\sqrt{x^2+4y^2}} \cdot \frac{x}{\cancel{\sqrt{x^2+y^2}}}$$

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

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

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

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

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

$$u_y = u_r \cdot r_y + u_\theta \cdot \theta_y$$

$$= \cancel{2\sqrt{x^2+y^2}}\ \frac{2y}{\sqrt{x^2+4y^2}} \cdot \frac{y}{\cancel{\sqrt{x^2+y^2}}}$$

$$+ 2(x^2+y^2) \cdot \frac{x}{\sqrt{x^2+4y^2}} \cdot \frac{x}{1+y^2}$$

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

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

#3.6.5(1)

$\vec{\nabla} T = (T_x, T_y, T_z)$

$= \left( \frac{2x}{(x^2-2y^2+4z^2)^2}, \frac{-4y}{(x^2-2y^2+4z^2)}, \frac{8z}{(x^2-2y^2+4z^2)} \right)$

$\vec{\nabla} T(1,2,-1)$

$= \left( \frac{2}{(1-8+4)^2}, \frac{-8}{9}, \frac{-8}{9} \right)$

$= \left( \frac{2}{9}, \frac{-8}{9}, \frac{-8}{9} \right)$

$= \frac{2}{9}(1, -4, -4)$

#3.6.9

타원면의 방정식을 $f(x,y,z)$라고 하자.

$\vec{\nabla} f = \left( \frac{1}{2}x, 2y, \frac{2}{9}z \right)$

$\vec{\nabla} f(-2,1,-3) = \left(-1, 2, -\frac{2}{3}\right)$

법선벡터 = $\left(-1, 2, -\frac{2}{3}\right)$

$-(x+2) + 2(y-1) - \frac{2}{3}(z+3) = 0$

$-x + 2y - \frac{2}{3}z - 2 - 2 - 2 = 0$

$-x + 2y - \frac{2}{3}z - 6 = 0$

접평면의 방정식: $-x + 2y - \frac{2}{3}z = 6$