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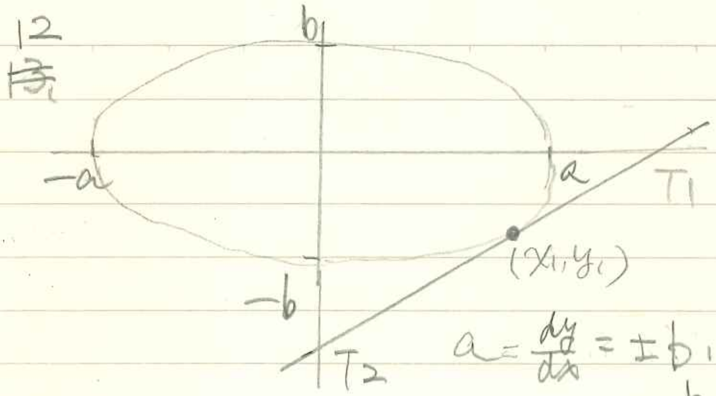
~~[illegible]~~



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

$$y^2=b^2\left(1-\frac{x^2}{a^2}\right)$$

$$y=\pm b\sqrt{1-\frac{x^2}{a^2}}$$

そのまま x で微分

$$2y\frac{dy}{dx}=-\frac{2b^2}{a^2}x$$

$$\frac{dy}{dx}=-\frac{b^2}{a^2}\frac{x}{y}$$

$$y-y_1=-\frac{b^2}{a^2}\frac{x_1}{y_1}(x-x_1)$$

$$a=\frac{dy}{dx}=\pm b\cdot\frac{1}{2}\left(1-\frac{x^2}{a^2}\right)^{-\frac{1}{2}}\left(-\frac{2x}{a^2}\right)$$

$$=\pm\frac{b}{a^2}x\left(1-\frac{x^2}{a^2}\right)^{-\frac{1}{2}}$$

$$Y-y_1=a(X-x_1)\quad \left(Y=\frac{b}{a^2}x_1\left(1-\frac{x^2}{a^2}\right)^{-\frac{1}{2}}X+y_1-ax_1\right.$$

$$\boxed{=\frac{b}{a^2}x_1\left(1-\frac{x_1^2}{a^2}\right)^{-\frac{1}{2}}X-b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}-ax_1}$$

$$X=0\rightarrow \overset{T_2}{Y}=-b\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}$$

$$Y=0\rightarrow X=b\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}\times\frac{\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}}{\frac{b}{a^2}x_1\left(1\right.}$$

T_1

$$=\left(1-\frac{x_1^2}{a^2}\right)\times b\times\frac{a^2}{bx_1}=a^2\left(1-\frac{x_1^2}{a^2}\right)\cancel{\ }x_1$$

$$z=T_1\times T_2=-b\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}\times a^2\left(1-\frac{x^2}{a^2}\right)\Big/x_1=a^2b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{3}{2}}\Big/x_1$$

$$z'=a^2b\cdot\frac{3}{2}\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}\times\left(-\frac{2x}{a^2}\right)\times x_1-a^2b\left(1-\frac{x^2}{a^2}\right)^{\frac{3}{2}}$$

まともに微分をやっていくと行き止まり!!

$$X=0\quad Y=-b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}-ax_1$$

$$Y=0\quad X=\frac{+b\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}+ax_1}{\frac{b}{a^2}x_1\left(1-\frac{x_1^2}{a^2}\right)^{-\frac{1}{2}}}$$

$$z=XY=\frac{-\left\{+b\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}+ax_1\right\}^2\times\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}}{\frac{b}{a^2}x_1}$$

$$=\left\{b^2\left(1-\frac{x^2}{a^2}\right)+2abx_1\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}+a^2x_1^2\right\}\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}\Big/\frac{b}{a^2}x_1$$

[第4象限について]

$$y=-b\sqrt{1-\frac{x^2}{a^2}}$$

(x_1, y_1) における値 $\frac{dy}{dx}=\frac{b}{a^2}x_1\left(1-\frac{x_1^2}{a^2}\right)^{-\frac{1}{2}}$

接線

$$Y=\frac{b}{a^2}x_1\left(1-\frac{x_1^2}{a^2}\right)^{-\frac{1}{2}}X-b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}-ax_1$$

$$X=0\rightarrow T_2=-\left\{b\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}\pm ax_1\right\}$$

$$Y=0\rightarrow T_1=\frac{b\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}}+ax_1}{\frac{b}{a^2}x_1\left(1-\frac{x_1^2}{a^2}\right)^{-\frac{1}{2}}}$$

$T_1\times T_2$

$$\frac{a^2x_1^2-b^2\left(1-\frac{x_1^2}{a^2}\right)}{\frac{b}{a^2}x_1\left(1-\frac{x_1^2}{a^2}\right)^{-\frac{1}{2}}}$$

$$\cancel{T_1 \times T_2 = \frac{(a^4+b^2)x_1^2 - a^2b^2}{b x_1 \left(1-\frac{x_1^2}{a^2}\right)^{-\frac{1}{2}}} = \frac{\{(a^4+b^2)x_1^2 - a^2b^2\}\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}}{b x_1}}$$

$T_1 T_2$の距離

$$z^2 = T_1^2 + T_2^2 =$$

$$T_1 = \frac{a^2\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}\left\{a^2 b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}} + a^3 x_1\right\}}{b x_1}$$

$$= \left\{b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}} + a x_1\right\}^2 + \frac{\left\{b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}} + a x_1\right\}^2}{\frac{b^2}{a^4}x_1^2} \times \left(1-\frac{x_1^2}{a^2}\right)$$

$$= \left\{b\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}} + a x_1\right\}^2 \left\{1 + \frac{a^4}{b^2 x_1^2}\left(1-\frac{x_1^2}{a^2}\right)\right\}$$

$$= \left\{b^2\left(1-\frac{x_1^2}{a^2}\right) + a^2 x_1^2 + 2ab x_1 \left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}\right\}\left\{1 + \frac{a^4}{b^2 x_1^2} - \frac{a^2}{b^2}\right\}$$

まともに微分して
行っても ダメ
どんづまり

$$\frac{dz^2}{dx} = \left\{-\frac{2b^2}{a^2}x + 2a^2 x + 2ab\left(1-\frac{x^2}{a^2}\right)^{\frac{1}{2}} + 2ab x_1 \cdot \frac{1}{2}\left(1-\frac{x^2}{a^2}\right)^{-\frac{1}{2}}\left(-\frac{2x_1}{a^2}\right)\right\}\left(1 - \frac{a^2}{b^2} + \frac{a^4}{b^2 x_1^2}\right)$$

$$+ \left\{b^2\left(1-\frac{x_1^2}{a^2}\right) + a^2 x_1^2 + 2ab x_1\left(1-\frac{x_1^2}{a^2}\right)^{\frac{1}{2}}\right\}\left\{-\frac{3a^4}{b^2 x_1^3}\right\}$$

$$y - y_1 = -\frac{b^2 x_1}{a^2 y_1}(x - x_1)$$

接線の方程式!!

$$a^2 y_1 y - a^2 y_1^2 = -b^2 x_1 x + b^2 x_1^2$$

$$\frac{y_1 y}{b^2} + \frac{x_1 x}{a^2} = \frac{y_1^2}{b^2} + \frac{x_1^2}{a^2} = 1$$

$$\boxed{\frac{x_1 x}{a^2} + \frac{y_1 y}{b^2} = 1}$$

$x_1 = 0 \rightarrow T_2 = \frac{b^2}{y_1}$ $\quad y_1 = 0 \rightarrow T_1 = \frac{a^2}{x_1}$

$b+a$ $\quad a^3$

$b-a$ $\quad a^3$

$$\boxed{z = T_1^2 + T_2^2 = \frac{a^4}{x_1^2} + \frac{b^4}{y_1^2}}$$

$$y_1^2 = \left(1 - \frac{x_1^2}{a^2}\right)b^2$$

$$= \frac{a^4}{x_1^2} + \frac{b^4}{\left(1-\frac{x_1^2}{a^2}\right)b^2} = \frac{a^4}{x_1^2} + \frac{b^2}{\left(1-\frac{x_1^2}{a^2}\right)} = \boxed{\frac{a^4}{x_1^2} + \frac{a^2b^2}{a^2 - x_1^2}}$$

$$= \frac{a^6 - a^4x^2 + a^2b^2x^2}{x^2(a^2-x^2)}$$

$$= \frac{a^6 + a^2(b^2-a^2)x^2}{x^2(a^2-x^2)}$$

$$\boxed{\frac{dz}{dx}} = -2a^4 x^{-3} + \frac{-b^2\left(-\frac{2x}{a^2}\right)}{\left(1-\frac{x^2}{a^2}\right)^2}$$

$$= \frac{-\frac{2a^4}{x^3} + \frac{4a^2}{x} - 2x + \frac{2b^2 x}{a^2}}{\left(1 - \frac{2x^2}{a^2} + \frac{x^4}{a^4}\right)}$$

$$-2a^4 + 4a^2x^2 - 2x^4 + \frac{2b^2}{a^2}x^4 \Big/ \left(1 - \frac{2x^2}{a^2} + \frac{x^4}{a^4}\right)$$

分子の部分が
因数分解できた!!

$$-a^6 + 2a^4x^2 - a^2x^4 + b^2x^4 = \boxed{(b^2-a^2)x^4 + 2a^4x^2 - a^6}$$

$$= \cancel{-2a^4x^{-3} - 2b^4y^{-3}\frac{dy}{dx}} \qquad x^2 = \frac{a^3}{a+b} \Rightarrow \{(b+a)x^2 - a^3\}\{(b-a)x^2 + a^3\} \Leftarrow$$

$$x = \frac{\sqrt{a^3}}{\sqrt{a+b}}$$

$$z = \frac{a^4(a+b)}{a^6} + \frac{b^2}{\left(1 - \frac{1}{a^2}\frac{a^3}{a+b}\right)} = \frac{a+b}{a^2} + \frac{b^2(a+b)}{(a+b-a^4)}$$

$-a^3bx^2 + a^4x^2$

$a^3bx^2 + a^4x^2$

No.

DATE

$x^2 = \frac{a^3}{a+b}$ $x = \frac{a^{\frac{3}{2}}}{\sqrt{a+b}}$ の時 $\frac{dz}{dx} = 0$ $(z = T_1^2 + T_2^2)$

$$T_1^2 = \frac{a^4}{x^2} = \boxed{a(a+b)}$$

$$T_2^2 = \frac{a^2b^2}{a^2 - x^2} = \frac{a^2b^2}{a^2 - \frac{a^3}{a+b}} = \frac{a^2b^2(a+b)}{a^3 + a^2b - a^3} = \boxed{b(a+b)}$$

$$z = (a+b)^2 = (\overline{T_1T_2})^2$$

従って T_1T_2 の最小は $a+b$