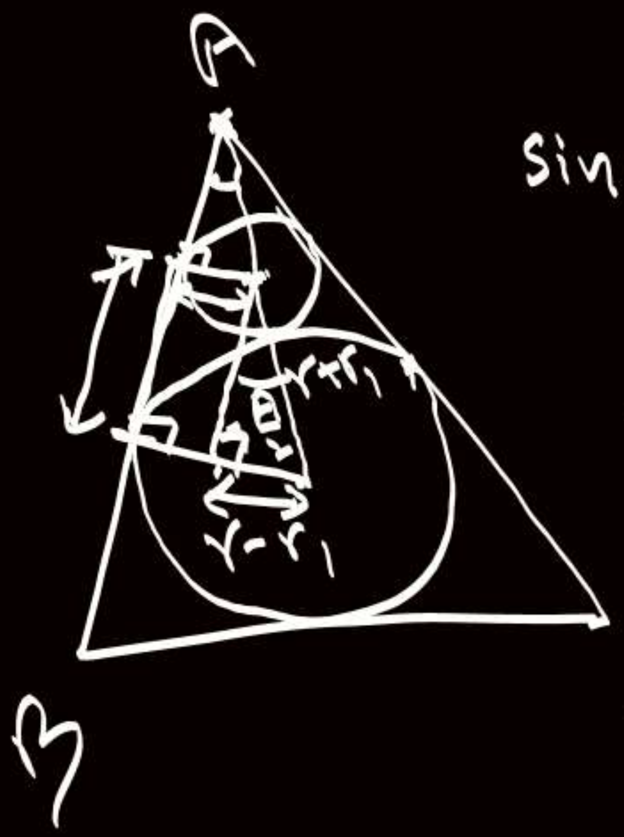


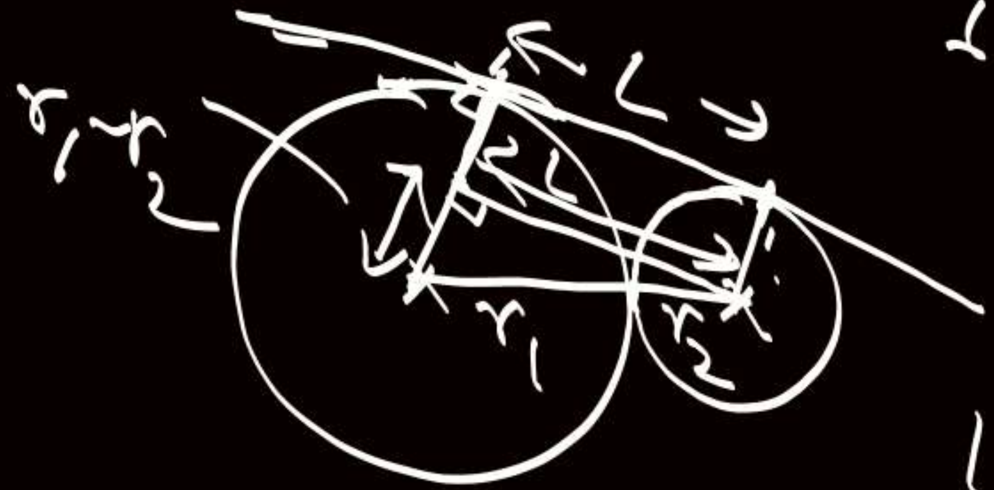
$$\sin\frac{A}{2} = \frac{r-r_1}{r+r_1}$$

$$\tan\frac{A}{2} = \frac{r-r_1}{2\sqrt{r r_1}}$$

C

$$\boxed{\sum \tan\frac{A}{2}\tan\frac{B}{2} = 1}$$

$$r = ?$$



$$L = \sqrt{(r_1+r_2)^2 - (r_1-r_2)^2} = 2\sqrt{r_1 r_2}$$

Nishant Jindal

1. Simplify $\begin{vmatrix} a^2+x^2 & ab & ca \\ ab & b^2+x^2 & bc \\ ca & cb & c^2+x^2 \end{vmatrix} = x^4(a^2+b^2+c^2+x^2)$.

$$= \frac{1}{abc}\begin{vmatrix} a(a^2+x^2) & a^2b & ca^2 \\ ab^2 & b(b^2+x^2) & b^2c \\ c^2a & c^2b & c(c^2+x^2) \end{vmatrix} = \begin{vmatrix} a^2+x^2 & a^2 & a^2 \\ b^2 & b^2+x^2 & b^2 \\ c^2 & c^2 & c^2+x^2 \end{vmatrix}$$

$R_1 \to R_1+R_2+R_3$

$$(a^2+b^2+c^2+x^2)\begin{vmatrix} 1 & 1 & 1 \\ b^2 & b^2+x^2 & b^2 \\ c^2 & c^2 & c^2+x^2 \end{vmatrix}$$

$C_2 \to C_2 - C_1,\ C_3 \to C_3 - C_1$

$$(a^2+b^2+c^2+x^2)\begin{vmatrix} 1 & 0 & 0 \\ b^2 & x^2 & 0 \\ c^2 & 0 & x^2 \end{vmatrix}$$

Nishant Jindal

2. Simplify $\begin{vmatrix} ax-by-cz & ay+bx & cx+az \\ ay+bx & by-cz-ax & bz+cy \\ cx+az & bz+cy & cz-ax-by \end{vmatrix}$

$C_1 \to xC_1 + yC_2 + zC_3$

$(x^2+y^2+z^2)(ax+by+cz)(a^2+b^2+c^2)$

$$= \frac{(x^2+y^2+z^2)}{x}\begin{vmatrix} a & ay+bx & cx+az \\ b & by-cz-ax & bz+cy \\ c & bz+cy & cz-ax-by \end{vmatrix} \xrightarrow{R_1 \to aR_1+bR_2+cR_3}$$

$$= \frac{(x^2+y^2+z^2)(a^2+b^2+c^2)}{ax}\begin{vmatrix} 1 & y & z \\ b & by-cz-ax & bz+cy \\ c & bz+cy & cz-ax-by \end{vmatrix} \xrightarrow[R_3 \to R_3 - cR_1]{R_2 \to R_2 - bR_1} \frac{(\sum x^2)(\sum a^2)}{ax}\begin{vmatrix} 1 & y & z \\ 0 & -cz-ax & cy \\ 0 & bz & -ax-by \end{vmatrix}$$

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3. Solve $\begin{vmatrix} u+a^2x & l+abx & m+acx \\ l+abx & v+b^2x & n+bcx \\ m+acx & n+bcx & w+c^2x \end{vmatrix} = 0$ for x

expnenning result in terms of determinant.

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Product of determinants

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} \begin{vmatrix} d_1 & d_2 & d_3 \\ e_1 & e_2 & e_3 \\ f_1 & f_2 & f_3 \end{vmatrix} = \begin{vmatrix} a_1d_1+a_2e_1+a_3f_1 & a_1d_2+a_2e_2+a_3f_2 & - \\ - & - & b_1d_3+b_2e_3+b_3f_3 \\ & & \end{vmatrix}$$

Row . Column ✓

Row Row

Column Row

Column Column

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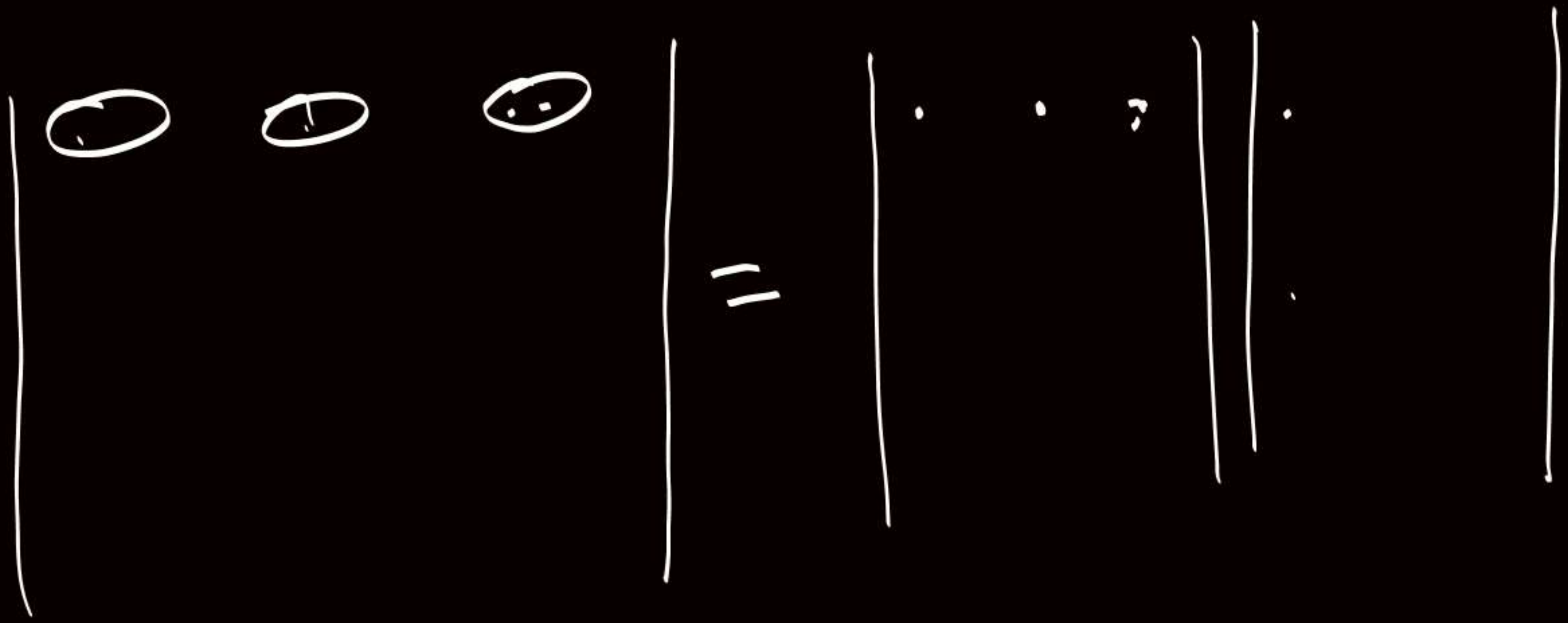

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1: Simplify $\begin{vmatrix} a_1 l_1 + b_1 m_1 & a_1 l_2 + b_1 m_2 & a_1 l_3 + b_1 m_3 \\ a_2 l_1 + b_2 m_1 & a_2 l_2 + b_2 m_2 & a_2 l_3 + b_2 m_3 \\ a_3 l_1 + b_3 m_1 & a_3 l_2 + b_3 m_2 & a_3 l_3 + b_3 m_3 \end{vmatrix}$

$$= \begin{vmatrix} a_1 & b_1 & 0 \\ a_2 & b_2 & 0 \\ a_3 & b_3 & 0 \end{vmatrix} \begin{vmatrix} l_1 & l_2 & l_3 \\ m_1 & m_2 & m_3 \\ 0 & 0 & 0 \end{vmatrix} = 0$$

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$a_1^2 - 2a_1 b_1 + b_1^2$

2.

$$\begin{vmatrix} (a_1-b_1)^2 & (a_1-b_2)^2 & (a_1-b_3)^2 \\ (a_2-b_1)^2 & (a_2-b_2)^2 & (a_2-b_3)^2 \\ (a_3-b_1)^2 & (a_3-b_2)^2 & (a_3-b_3)^2 \end{vmatrix} = \begin{vmatrix} a_1^2 & -2a_1 & 1 \\ a_2^2 & -2a_2 & 1 \\ a_3^2 & -2a_3 & 1 \end{vmatrix} \begin{vmatrix} 1 & 1 & 1 \\ b_1 & b_2 & b_3 \\ b_1^2 & b_2^2 & b_3^2 \end{vmatrix}$$

$$2\begin{vmatrix} 1 & a_1 & a_1^2 \\ 1 & a_2 & a_2^2 \\ 1 & a_3 & a_3^2 \end{vmatrix} \begin{vmatrix} 1 & b_1 & b_1^2 \\ 1 & b_2 & b_2^2 \\ 1 & b_3 & b_3^2 \end{vmatrix}$$

$\boxed{\begin{array}{l} \text{Ex} - \underline{\text{III}} \\ \text{Ex} - \underline{\text{IV}} \end{array}}$

99.5+

$$\boxed{\begin{array}{l} = 2(a_1-a_2)(a_2-a_3)(a_3-a_1) \\ (b_1-b_2)(b_2-b_3)(b_3-b_1) \end{array}}$$