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कक्षा - 10

Chapter - 8

Introduction Of Trigonometry

त्रिकोणमिति का परिचय

निबंधात्मक प्रश्न

REVISION WITH QUESTIONS

Lakhan Saini

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कुल अंकभार 8		
प्रश्न	अंक	प्रकार
1	1	वस्तुनिष्ठ प्रश्न
1	1	रिक्तस्थान
1	2	लघुत्तरात्मक प्रश्न
1	4	निबंधात्मक प्रश्न

निबंधात्मक प्रश्न

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1. सिद्ध कीजिए कि

$$\sec A\,(1-\sin A)\,(\sec A+\tan A)=1$$

हल :- $LHS = \sec A(1-\sin A)(\sec A+\tan A)$

$$= \frac{1}{\cos A}(1-\sin A)\left(\frac{1}{\cos A}+\frac{\sin A}{\cos A}\right)$$

$$= \frac{1}{\cos A}(1-\sin A)\left(\frac{1+\sin A}{\cos A}\right)$$

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$$= \frac{1^2 - \sin^2 A}{\cos^2 A} \qquad [\sin^2 A + \cos^2 A = 1]$$

$$= \frac{\cos^2 A}{\cos^2 A}$$

$$= 1 = \text{RHS}$$

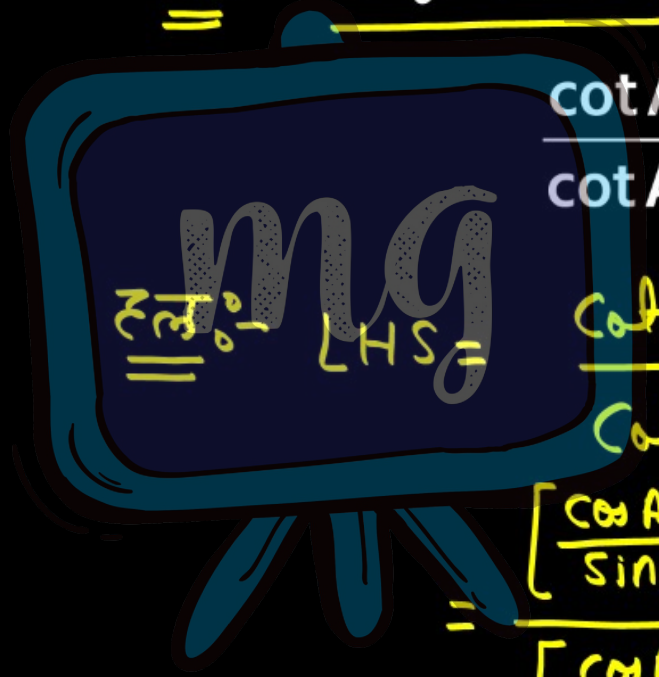
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2. सिद्ध कीजिए कि

$$\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$$



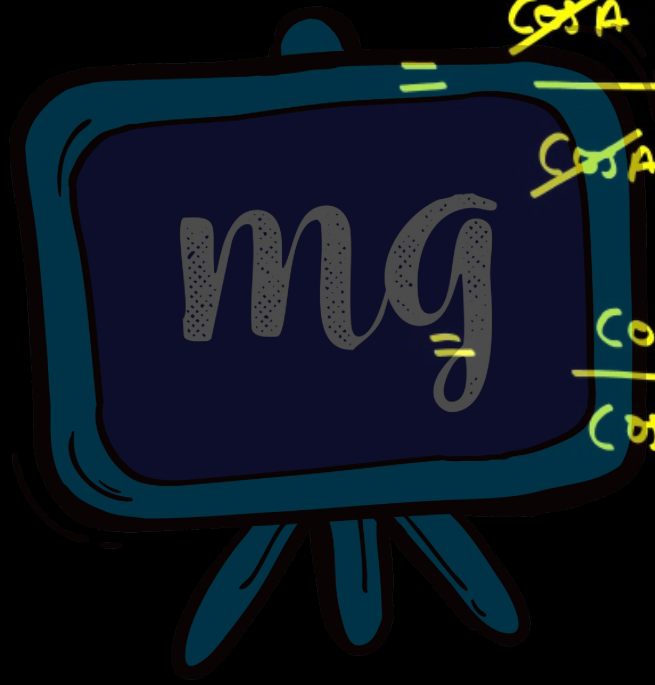
हल :- LHS $= \dfrac{\cot A - \cos A}{\cot A + \cos A}$

$= \dfrac{\left[\frac{\cos A}{\sin A} - \frac{\cos A}{1}\right]}{\left[\frac{\cos A}{\sin A} + \frac{\cos A}{1}\right]}$ $\left\{\cot A = \frac{\cos A}{\sin A}\right\}$

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$$= \frac{\cancel{\cos A}\left(\frac{1}{\sin A} - \frac{1}{1}\right)}{\cancel{\cos A}\left(\frac{1}{\sin A} + \frac{1}{1}\right)}$$

$$= \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1} = \text{R.H.S.}$$

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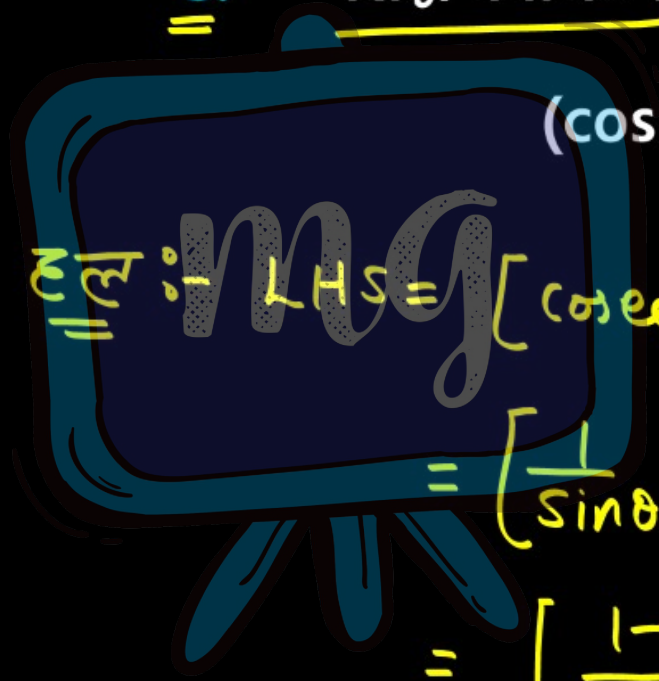
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3. सिद्ध कीजिए कि

$$(\operatorname{cosec}\theta - \cot\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$$



हल :- LHS $= [\operatorname{cosec}\theta - \cot\theta]^2$

$$= \left[\frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}\right]^2$$

$$= \left[\frac{1-\cos\theta}{\sin\theta}\right]^2$$

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$$= \frac{(1-\cos\theta)^2}{\sin^2\theta}$$

$$= \frac{(1-\cos\theta)^2}{1-\cos^2\theta} \qquad [\sin^2\theta+\cos^2\theta=1]$$

$$= \frac{(1-\cos\theta)^2}{(1-\cos\theta)(1+\cos\theta)}$$

$$= \frac{1-\cos\theta}{1+\cos\theta} = \text{RHS}$$

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4. सिद्ध कीजिए कि

$$\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}=2\sec A$$

हल :- $LHS=\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}$

$$=\frac{\cos^2 A+(1+\sin A)^2}{(1+\sin A)\cos A}$$

$$(A+B)^2=A^2+2AB+B^2$$

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$$= \frac{\cos^2 A + 1 + 2\sin A + \sin^2 A}{(1+\sin A)\cos A}$$

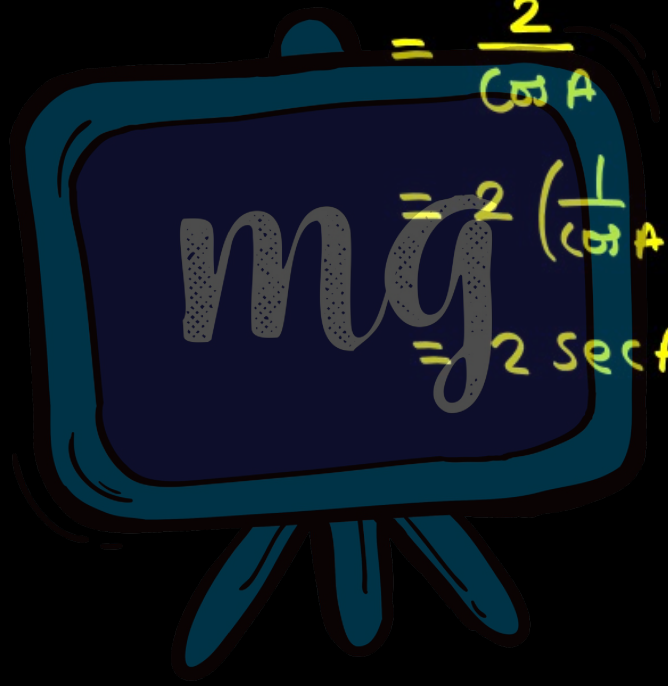
$$= \frac{1 + ((\cos^2 A + \sin^2 A) + 2\sin A}{(1+\sin A)\cos A}$$

$$= \frac{1+1+2\sin A}{(1+\sin A)\cos A}$$

$$= \frac{2+2\sin A}{(1+\sin A)\cos A} = \frac{2(1+\sin A)}{(1+\sin A)\cos A}$$

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$$= \frac{2}{\cos A}$$

$$= 2\left(\frac{1}{\cos A}\right)$$

$$= 2 \sec A = \text{RHS}$$

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5. सिद्ध कीजिए कि

$$\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}=1+\sec\theta\,\mathrm{cosec}\,\theta$$

हल :- $LHS=\dfrac{\tan\theta}{1-\cot\theta}+\dfrac{\cot\theta}{1-\tan\theta}$

$$=\frac{\left(\frac{\sin\theta}{\cos\theta}\right)}{\left(\frac{1}{1}-\frac{\cos\theta}{\sin\theta}\right)}+\frac{\left(\frac{\cos\theta}{\sin\theta}\right)}{\left(\frac{1}{1}-\frac{\sin\theta}{\cos\theta}\right)}$$

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$$= \frac{\left(\frac{\sin\theta}{\cos\theta}\right)}{\left(\frac{\sin\theta-\cos\theta}{\sin\theta}\right)} + \frac{\left(\frac{\cos\theta}{\sin\theta}\right)}{\left(\frac{\cos\theta-\sin\theta}{\cos\theta}\right)}$$

$$= \frac{\sin^2\theta}{\cos\theta(\sin\theta-\cos\theta)} + \frac{\cos^2\theta}{\sin\theta(\cos\theta-\sin\theta)}$$

$$= \frac{\sin^2\theta}{\cos\theta(\sin\theta-\cos\theta)} - \frac{\cos^2\theta}{\sin\theta(\sin\theta-\cos\theta)}$$

$$= \frac{\sin^3\theta - \cos^3\theta}{\sin\theta\cos\theta(\sin\theta-\cos\theta)}$$

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$$A^3 - B^3 = (A-B)(A^2+B^2+AB)$$

$$= \frac{(\sin\theta - \cos\theta)(\sin^2\theta + \cos^2\theta + \sin\theta\cos\theta)}{\sin\theta\cos\theta\,(\sin\theta - \cos\theta)}$$

$$= \frac{1 + \sin\theta\cos\theta}{\sin\theta\cos\theta}$$

$$= \frac{1}{\sin\theta\cos\theta} + \frac{\sin\theta\cos\theta}{\sin\theta\cos\theta}$$

$$= \frac{1}{\sin\theta} \times \frac{1}{\cos\theta} + 1$$

$$= \operatorname{cosec}\theta \sec\theta + 1$$

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$= 1 + \sec\theta \cdot \sec\theta = RHS$

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6. सिद्ध कीजिए कि $\frac{1+\sec A}{\sec A} = \frac{\sin^2 A}{1-\cos A}$

हल :- $LHS = \frac{1+\sec A}{\sec A}$

$= \frac{\left(1+\frac{1}{\cos A}\right)}{\left(\frac{1}{\cos A}\right)}$

$= \frac{(\cos A + 1/\cos A)}{(1/\cos A)} = 1+\cos A$

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$$\frac{1+\cos A}{1-\cos A} \times (1-\cos A)$$

$$= \frac{1-\cos^2 A}{1-\cos A}$$

$$= \frac{\sin^2 A}{1-\cos A} = RHS$$

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M-II

$$RHS. = \frac{\sin^2 A}{1-\cos A}$$

$$= \frac{1-\cos^2 A}{1-\cos A}$$

$$= \frac{(1-\cos A)(1+\cos A)}{(1-\cos A)}$$

$$= 1+\cos A$$

$\therefore$ LHS = RHS

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7. सिद्ध कीजिए कि $\dfrac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$

हल :- LHS $= \dfrac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta}$

$= \dfrac{\sin\theta(1 - 2\sin^2\theta)}{\cos\theta(2\cos^2\theta - 1)}$

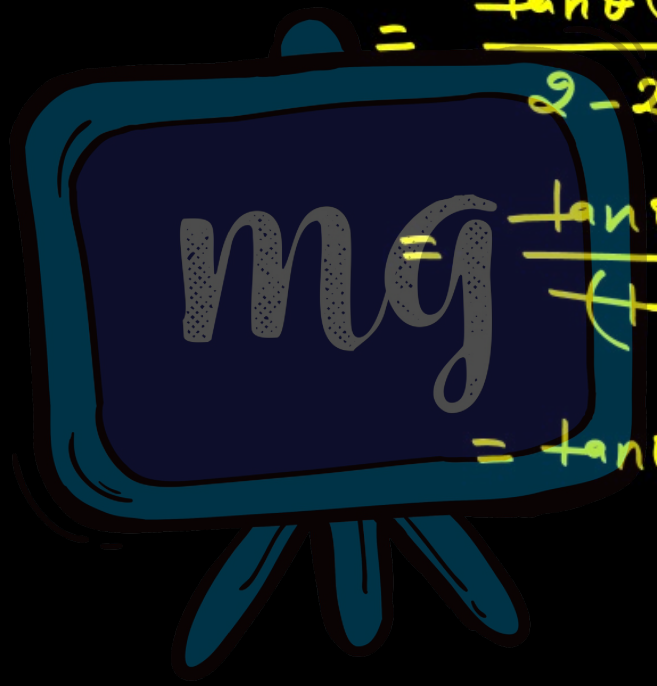
$\because \sin^2\theta + \cos^2\theta = 1$

$= \dfrac{\tan\theta(1 - 2\sin^2\theta)}{2[1 - \sin^2\theta] - 1}$

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$$= \frac{\tan\theta(1-2\sin^2\theta)}{2-2\sin^2\theta-1}$$

$$= \frac{\tan\theta(1-2\sin^2\theta)}{(1-2\sin^2\theta)}$$

$$= \tan\theta = \text{RHS}$$

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8. सिद्ध कीजिए कि

$$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$$

हल :- LHS $= (\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2$

$= \sin^2 A + 2 \sin A \operatorname{cosec} A + \operatorname{cosec}^2 A + \cos^2 A + 2 \sec A \cos A + \sec^2 A$

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$$= (\sin^2 A + \cos^2 A) + 2\sin A\left(\frac{1}{\sin A}\right) + 2\cos A\left(\frac{1}{\cos A}\right)$$

$$+ (1 + \cot^2 A) + (1 + \tan^2 A)$$

$$= 1 + 2 + 2 + 1 + 1 + \tan^2 A + \cot^2 A$$

$$= 7 + \tan^2 A + \cot^2 A = RHS$$

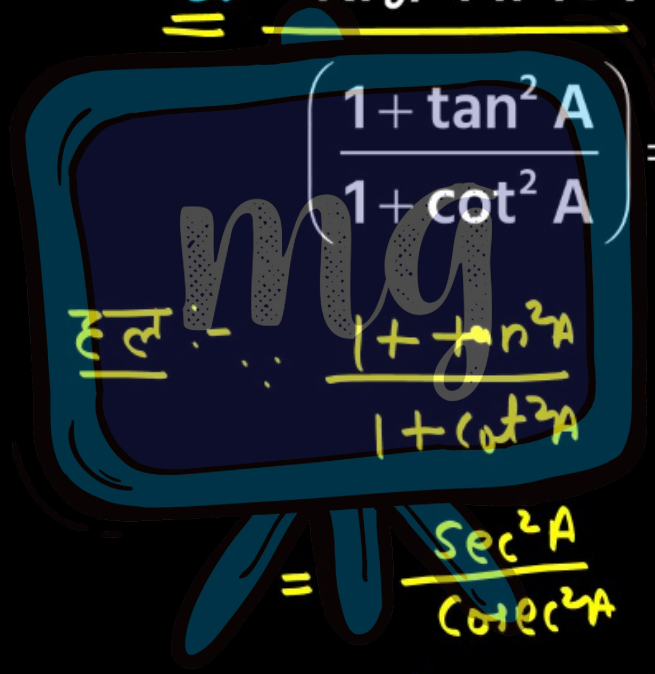
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9. सिद्ध कीजिए कि

$$\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$$



हल :- $\frac{1+\tan^2 A}{1+\cot^2 A}$

$= \frac{\sec^2 A}{\operatorname{cosec}^2 A}$

$= \left(\frac{1}{\cos^2 A}\right) \Big/ \left(\frac{1}{\sin^2 A}\right) = \frac{\sin^2 A}{\cos^2 A}$

$= \tan^2 A$

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तथा : $\left(\frac{1-\tan A}{1-\cot A}\right)^2$

$$= \left[\frac{\left(1-\frac{\sin A}{\cos A}\right)}{\left(1-\frac{\cos A}{\sin A}\right)}\right]^2$$

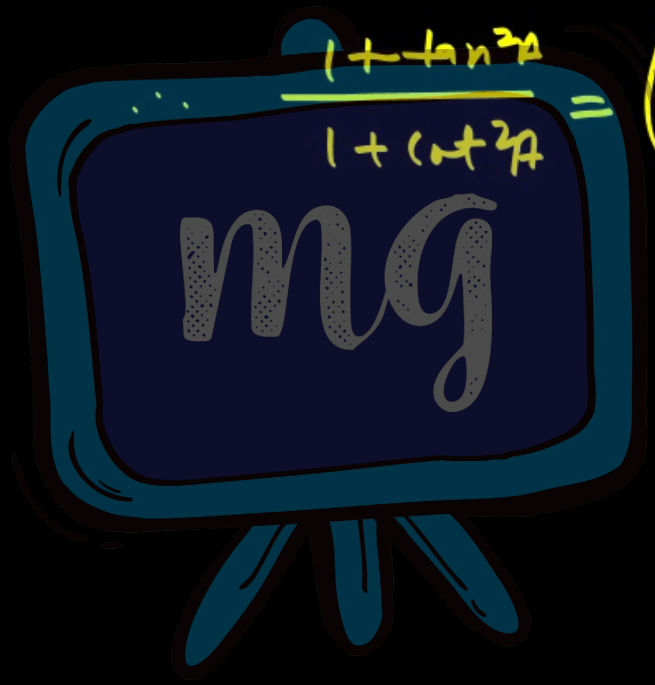
$$= \left[\frac{\left(\frac{\cos A-\sin A}{\cos A}\right)}{\left(\frac{\sin A-\cos A}{\sin A}\right)}\right]^2 = \left[\frac{\sin A(\cos A-\sin A)}{\cos A(\sin A-\cos A)}\right]^2 \quad (-1)$$

$$= (-\tan A)^2$$

$$= \tan^2 A$$

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$$\therefore \frac{1+\tan^2 A}{1+\cot^2 A} = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$$

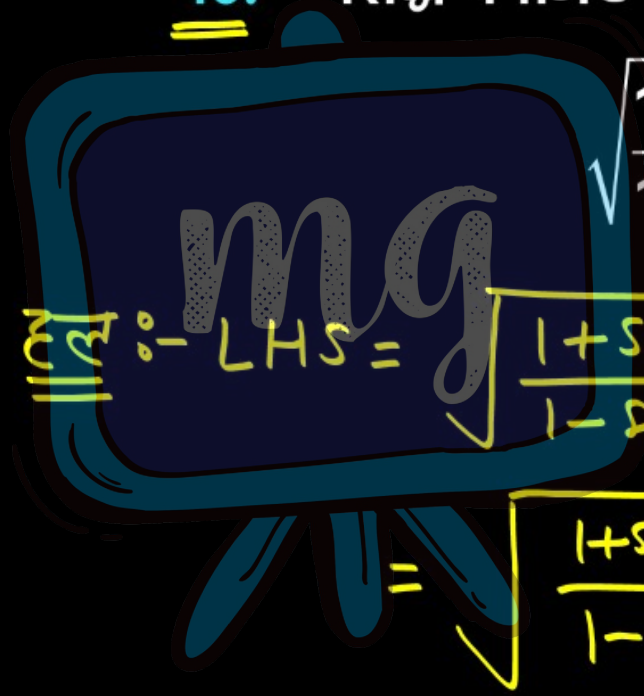
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10. सिद्ध कीजिए कि

$$\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$$



हल :- $LHS = \sqrt{\frac{1+\sin A}{1-\sin A}}$

$$= \sqrt{\frac{1+\sin A}{1-\sin A} \times \frac{1+\sin A}{1+\sin A}}$$

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$$= \sqrt{\frac{(1+\sin A)^2}{1-\sin^2 A}}$$

$$= \sqrt{\frac{(1+\sin A)^2}{\cos^2 A}}$$

$$= \frac{1+\sin A}{\cos A}$$

$$= \frac{1}{\cos A} + \frac{\sin A}{\cos A}$$

$$= \sec A + \tan A = \text{RHS}$$

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$y = x|x|$

$= \begin{cases} -x^2 & x < 0 \\ x^2 & x \geq 0 \end{cases}$

$\int_{-1}^{1} |x|\,dx = \int_{-1}^{0} -x^2\,dx + \int_{0}^{1} x^2\,dx$

$\left(\frac{x^3}{3}\right)_{-1}^{0} + \left(\frac{x^3}{3}\right)_{0}^{1}$

$\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$

