

Prove the following identities: 3.  $\sin \theta \tan \theta + \cos \theta = \sec \theta$

$$\begin{aligned} \tan \theta &= \frac{\sin \theta}{\cos \theta} \\ \sin^2 \theta + \cos^2 \theta &= 1 \\ \text{LHS} &= \sin \theta \frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{1} \\ &= \frac{\sin^2 \theta + \cos^2 \theta}{\cos \theta} \\ &= \frac{1}{\cos \theta} \\ &= \sec \theta \end{aligned}$$

1.  $\operatorname{cosec} \theta = \frac{1}{\sin \theta}$

2.  $\sec \theta = \frac{1}{\cos \theta}$

3.  $\tan \theta = \frac{\sin \theta}{\cos \theta}$

4.  $\cot \theta = \frac{\cos \theta}{\sin \theta}$

5.  $\sin^2 \theta + \cos^2 \theta = 1$

6.  $1 + \tan^2 \theta = \sec^2 \theta$

Prove the following identities: 4.  $\frac{\sin \theta}{\sqrt{1 - \sin^2 \theta}} = \tan \theta$

$$\begin{aligned} 1 - \sin^2 \theta &= \cos^2 \theta \\ \text{LHS} &= \frac{\sin \theta}{\sqrt{\cos^2 \theta}} \\ &= \frac{\sin \theta}{\cos \theta} \\ &= \tan \theta \end{aligned}$$

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6.  $1 + \tan^2 \theta = \sec^2 \theta$

Prove the following identities: 5.  $\sec A - \sin A \tan A = \cos A$

$$\begin{aligned} \sec \theta &= \frac{1}{\cos \theta} \\ \tan \theta &= \frac{\sin \theta}{\cos \theta} \\ 1 - \sin^2 A &= \cos^2 A \end{aligned}$$

$$\begin{aligned} \text{LHS} &= \frac{1}{\cos A} - \sin A \frac{\sin A}{\cos A} \\ &= \frac{1 - \sin^2 A}{\cos A} \\ &= \frac{\cos^2 A}{\cos A} \\ &= \cos A \end{aligned}$$

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Prove the following identities: 6.  $1 - \tan^2 \theta \cos^2 \theta = \cos^2 \theta$

$$\begin{aligned} \tan A &= \frac{\sin A}{\cos A} \\ \tan^2 A &= \frac{\sin^2 A}{\cos^2 A} \\ 1 - \sin^2 A &= \cos^2 A \end{aligned}$$

$$\begin{aligned} \text{LHS} &= 1 - \frac{\sin^2 A \cos^2 A}{\cos^2 A} \\ &= \cos^2 A \end{aligned}$$

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