

1. Trigonometric Identities

- Reciprocal ratios

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

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

$$\cot \theta = \frac{1}{\tan \theta}$$

- Complementary Angles

$$\sin \theta = \cos(90^\circ - \theta)$$

$$\operatorname{cosec} \theta = \sec(90^\circ - \theta)$$

$$\tan \theta = \cot(90^\circ - \theta)$$

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

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

- Pythagorean identities

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

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

$$1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$$

- Angles in Quadrant 2

$$\sin(180^\circ - \theta) = \sin \theta$$

$$\cos(180^\circ - \theta) = -\cos \theta$$

$$\tan(180^\circ - \theta) = -\tan \theta$$

- Angles in Quadrant 3

$$\sin(180^\circ + \theta) = -\sin \theta$$

$$\cos(180^\circ + \theta) = -\cos \theta$$

$$\tan(180^\circ + \theta) = \tan \theta$$

- Angles in Quadrant 4

$$\sin(360^\circ - \theta) = -\sin \theta$$

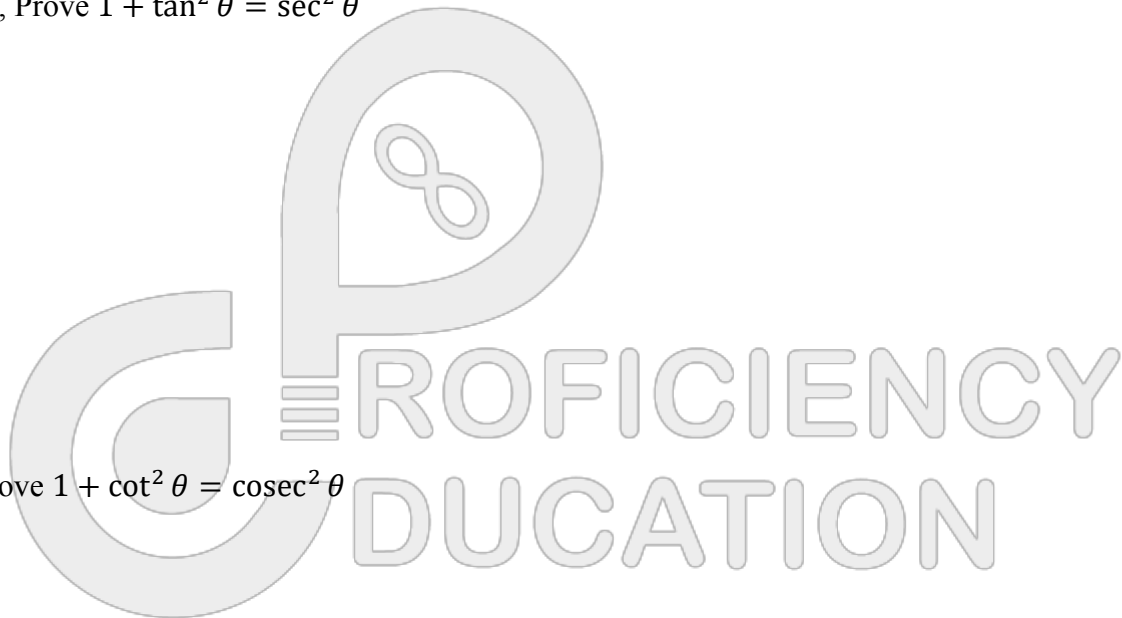
$$\cos(360^\circ - \theta) = \cos \theta$$

$$\tan(360^\circ - \theta) = -\tan \theta$$

Prove $\sin^2 \theta + \cos^2 \theta = 1$ using a unit circle

Hence, Prove $1 + \tan^2 \theta = \sec^2 \theta$

and prove $1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$



Simplify $\sin \theta \cot \theta$

$\cos \theta$

Simplify $\frac{1 - \cos^2 \theta}{1 - \sin^2 \theta}$

$\tan^2 \theta$

Simplify $1 + \tan^2(90^\circ - \theta)$

$\operatorname{cosec}^2 \theta$

Simplify $\frac{\cos(90 - \theta)}{\sin(90 - \theta)}$

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