

# Assignment 1

Name : Harshit Pant

Roll Number : CS21BTECH11021

**Q.6(c) [ICSE 2018] :** Prove that

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 2$$

**Solution :**

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = (1 + \cot \theta - \csc \theta) + \tan \theta(1 + \cot \theta - \csc \theta) + \sec \theta(1 + \cot \theta - \csc \theta)$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 1 + \cot \theta - \csc \theta + \tan \theta + \tan \theta \times \cot \theta - \tan \theta \times \csc \theta + \sec \theta \\ + \sec \theta \times \cot \theta - \sec \theta \times \csc \theta$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 1 + \cot \theta - \csc \theta + \tan \theta + 1 - \frac{\cancel{\sin \theta}}{\cos \theta} \times \frac{1}{\cancel{\sin \theta}} + \sec \theta + \frac{1}{\cancel{\cos \theta}} \times \frac{\cancel{\cos \theta}}{\sin \theta} \\ - \sec \theta \times \csc \theta$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 1 + \cot \theta - \cancel{\csc \theta} + \tan \theta + 1 - \cancel{\sec \theta} + \cancel{\sec \theta} + \cancel{\csc \theta} - \sec \theta \times \csc \theta$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 2 + \frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta} - \sec \theta \times \csc \theta$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 2 + \frac{\cos^2 \theta + \sin^2 \theta}{\sin \theta \times \cos \theta} - \sec \theta \times \csc \theta$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 2 + \frac{1}{\sin \theta \times \cos \theta} - \sec \theta \times \csc \theta \quad (\because \cos^2 \theta + \sin^2 \theta = 1)$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 2 + \cancel{\csc \theta \times \sec \theta} - \cancel{\sec \theta \times \csc \theta}$$

$$(1 + \cot \theta - \csc \theta)(1 + \tan \theta + \sec \theta) = 2$$

$$\text{L.H.S} = \text{R.H.S}$$

Hence proved.

**Output**