Honors Algebra II
Proofs – Day 3

Name KEY
Date_____ **Period**____

Prove.

1. $\dfrac{\sin^2\vartheta}{\cos\vartheta} = \sec\vartheta - \cos\vartheta$

Work on left side.

- $\dfrac{1-\cos^2\theta}{\cos\theta} = \sec\theta - \cos\theta$
- $\dfrac{1}{\cos\theta} - \dfrac{\cos^2\theta}{\cos\theta} = \sec\theta - \cos\theta$
- $\sec\theta - \cos\theta = \sec\theta - \cos\theta$

2. $\dfrac{\sin^2\vartheta}{\cos\vartheta} = \sec\vartheta - \cos\vartheta$

Work on right side.

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

3. $\dfrac{\cos\vartheta}{\sin\vartheta\cot\vartheta} = 1$

- $\dfrac{\cos\theta}{\frac{\sin\theta}{1}\cdot\frac{\cos\theta}{\sin\theta}} = 1$
- $\dfrac{\cos\theta}{\cos\theta} = 1$
- $1 = 1$

4. $\tan^2\vartheta\sin^2\vartheta = \tan^2\vartheta + \cos^2\vartheta - 1$

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

5. $\dfrac{1}{\sec^2\vartheta} + \dfrac{1}{\csc^2\vartheta} = 1$

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

6. $(1-\tan\vartheta)^2 = \sec^2\vartheta - 2\tan\vartheta$

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

Prove.

7. $\dfrac{\sec^2\theta - 1}{\sec^2\theta} = \sin^2\theta$

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

8. $\cot\vartheta + \tan\vartheta = \sec\vartheta\csc\vartheta$

- $\dfrac{\cos\theta}{\sin\theta} + \dfrac{\sin\theta}{\cos\theta} = \sec\theta\csc\theta$
- $\dfrac{\cos^2\theta}{\sin\theta\cos\theta} + \dfrac{\sin^2\theta}{\cos\theta\sin\theta} = \sec\theta\csc\theta$
- $\dfrac{\cos^2\theta + \sin^2\theta}{\sin\theta\cos\theta} = \sec\theta\csc\theta$
- $\dfrac{1}{\sin\theta\cos\theta} = \sec\theta\csc\theta$
- $\dfrac{1}{\sin\theta} \cdot \dfrac{1}{\cos\theta} = \sec\theta\csc\theta$
- $\csc\theta\sec\theta = \sec\theta\csc\theta$
- $\sec\theta\csc\theta = \sec\theta\csc\theta$

9. $\dfrac{\cot^2\vartheta}{\csc\vartheta} = \csc\vartheta - \sin\vartheta$

- $\dfrac{\csc^2\theta - 1}{\csc\theta} = \csc\theta - \sin\theta$
- $\dfrac{\csc^2\theta}{\csc\theta} - \dfrac{1}{\csc\theta} = \csc\theta - \sin\theta$
- $\csc\theta - \sin\theta = \csc\theta - \sin\theta$

10. $\cos^2\vartheta - \sin^2\vartheta = 2\cos^2\vartheta - 1$

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

11. $\sin^2\vartheta - \sin^4\vartheta = \cos^2\vartheta - \cos^4\vartheta$

- $\sin^2\theta(1 - \sin^2\theta) = \cos^2\theta - \cos^4\theta$
- $\sin^2\theta(\cos^2\theta) = \cos^2\theta - \cos^4\theta$
- $1 - \cos^2\theta(\cos^2\theta) = \cos^2\theta - \cos^4\theta$
- $\cos^2\theta - \cos^4\theta = \cos^2\theta - \cos^4\theta$

12. $\cot\vartheta + 1 = \csc\vartheta(\cos\vartheta + \sin\vartheta)$

- $\cot\theta + 1 = \csc\theta\cos\theta + \csc\theta\sin\theta$
- $\cot\theta + 1 = \dfrac{1}{\sin\theta} \cdot \dfrac{\cos\theta}{1} + \dfrac{1}{\sin\theta} \cdot \dfrac{\sin\theta}{1}$
- $\cot\theta + 1 = \dfrac{\cos\theta}{\sin\theta} + \dfrac{\sin\theta}{\sin\theta}$
- $\cot\theta + = \cot\theta + 1$