

### Homework 16 Solutions

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

4)

$$\begin{aligned} \cos \beta + [\cot \beta][1 - \sin \beta] &= \cos \beta + \left[ \frac{\cos \beta}{\sin \beta} \right][1 - \sin \beta] = \\ \cos \beta \left[ 1 + \frac{1 - \sin \beta}{\sin \beta} \right] &= \cos \beta \left[ \frac{\sin \beta + 1 - \sin \beta}{\sin \beta} \right] = \cos \beta \frac{1}{\sin \beta} = \frac{\cos \beta}{\sin \beta} = \cot \beta \end{aligned}$$

8)

$$\begin{aligned} \sin^2(x)[1 + \cot^2(x)] &= \sin^2(x) \left[ 1 + \frac{\cos^2(x)}{\sin^2(x)} \right] = \sin^2(x) + \frac{\sin^2(x)\cos^2(x)}{\sin^2(x)} = \\ \sin^2(x) + \cos^2(x) &= 1 \end{aligned}$$

$$10) \frac{\cos^2(\theta) + \sin^2(\theta)}{1 + \tan^2(\theta)} = \frac{1}{\sec^2(\theta)} = \cos^2(\theta)$$

$$12) 2 \cos^2(\theta) + \sin^2(\theta) = \cos^2(\theta) + \cos^2(\theta) + \sin^2(\theta) = \cos^2(\theta) + 1$$

$$14) -\csc(\theta) = -\frac{1}{\sin(\theta)} = \frac{1}{-\sin(\theta)} = \frac{1}{\sin(-\theta)}$$

$$18) \csc^2(-y)\sin^2(-y) = \csc^2(y)\sin^2(y) = \frac{1}{\sin^2(y)}\sin^2(y) = 1$$

$$20) \sin\left(\frac{\pi}{2} - \theta\right)\sec(\theta) = \cos(\theta)\sec(\theta) = \cos(\theta)\frac{1}{\cos(\theta)} = 1$$

22)

$$\cos(\beta)\cot\left(\frac{\pi}{2} - \beta\right) = \cos(\beta)\tan(\beta) = \cos(\beta)\frac{\sin(\beta)}{\cos(\beta)} = \sin(\beta)$$

$$24) \frac{\cot(x)\cos(x)}{\sin\left(\frac{\pi}{2} - x\right)\tan(-x)} = \frac{\cot(x)\cos(x)}{\cos(x)\tan(-x)} = -\frac{\cot(x)}{\tan(x)} = -\cot^2(x)$$

28)

$$\cos(\theta)[\tan(\theta) + \cot(\theta)] = \cos(\theta)\left[\frac{\sin(\theta)}{\cos(\theta)} + \frac{\cos(\theta)}{\sin(\theta)}\right] =$$

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

$$30) \cot(\theta) \tan(-\theta) = \frac{\cos(\theta)}{\sin(\theta)} \cdot \frac{\sin(-\theta)}{\cos(-\theta)} = \frac{\cos(\theta)}{\sin(\theta)} \cdot \frac{-\sin(\theta)}{\cos(\theta)} = -1$$

$$32) \sec^2\left(\frac{\pi}{2} - \theta\right) - 1 = \csc^2(\theta) - 1 = \cot^2(\theta)$$

$$36) \frac{\cos^2\left(\frac{\pi}{2} - \theta\right)}{\cos(\theta)} = \frac{\sin^2(\theta)}{\cos(\theta)} = \sin(\theta) \tan(\theta)$$

40) (No need to do this one)

42) (No need to do this one)

44)

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

50)

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

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

52)

$$\sec(\theta) - \tan(\theta) = \frac{1}{\cos(\theta)} - \frac{\sin(\theta)}{\cos(\theta)} = \frac{1 - \sin(\theta)}{\cos(\theta)} = \frac{1 - \sin(\theta)}{\cos(\theta)} \cdot \frac{1 + \sin(\theta)}{1 + \sin(\theta)} =$$

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