6.3 CONTINUED

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

$A^2 - B^2 = (A+B)(A-B)$

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

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

$$= 1 - (1-\sin\theta)$$

$$= 1 - 1 + \sin\theta$$

$$= \sin\theta$$

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

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

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

TURN IN:

$$\frac{\csc\theta + 1}{\csc\theta - 1} = \frac{1+\sin\theta}{1-\sin\theta}$$

Notes: $9\sec^2\theta - 5\tan^2\theta = 5 + 4\sec^2\theta$

$$\begin{aligned} 9\sec^2\theta - 5\tan^2\theta &= 9\sec^2\theta - 5(\sec^2\theta - 1) \\ &= 9\sec^2\theta - 5\sec^2\theta + 5 \\ &= 5 + 4\sec^2\theta \end{aligned}$$

TURN IN $3\sin^2\theta + 4\cos^2\theta = 3 + \cos^2\theta$

$$\begin{aligned} 3\sin^2\theta + 4\cos^2\theta &= 3\sin^2\theta + 3\cos^2\theta + \cos^2\theta \\ &= 3(\sin^2\theta + \cos^2\theta) + \cos^2\theta \\ &= 3 \cdot 1 + \cos^2\theta \\ &= 3 + \cos^2\theta \end{aligned}$$

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

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

$$\csc\theta - \cot\theta = \frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}$$

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

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

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

$$= \csc\theta - \cot\theta$$

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

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

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

$$= \frac{\sin\theta}{1+\cos\theta}$$

TURN IN:

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

BONUS: $\dfrac{1+\cos\theta+\sin\theta}{1+\cos\theta-\sin\theta} = \sec\theta + \tan\theta$