

Warm-up #7: Verifying

$$1. (\sec^2\theta)(1 - \cos^2\theta) = \boxed{\tan^2\theta}$$

$$= \sec^2\theta \cdot \sin^2\theta$$

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

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

$$= \boxed{\tan^2\theta} \quad \checkmark$$

$$2. \frac{\cos\theta}{1 + \sin\theta} + \tan\theta = \boxed{\sec\theta}$$

conjugate \downarrow

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

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

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

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

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

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

$$= \boxed{\sec\theta} \quad \checkmark$$