Exercise 148

For the following exercises, verify that each equation is an identity.

$$\frac{\sec^2\theta}{\tan\theta} = \sec\theta\csc\theta$$

Solution

$$\frac{\sec^2\theta}{\tan\theta} \stackrel{?}{=} \sec\theta\csc\theta$$

$$\sec\theta\left(\frac{\sec\theta}{\tan\theta}\right) \stackrel{?}{=} \sec\theta\csc\theta$$

$$\sec\theta\left[\frac{\left(\frac{1}{\cos\theta}\right)}{\left(\frac{\sin\theta}{\cos\theta}\right)}\right] \stackrel{?}{=} \sec\theta\csc\theta$$

$$\sec\theta\left(\frac{1}{\sin\theta}\right) \stackrel{?}{=} \sec\theta\csc\theta$$

$$\sec\theta\csc\theta = \sec\theta\csc\theta$$

This is a true statement, so the identity is verified.