

318: 51, 53

$$51. \tan x - \csc x \sec x$$

$$= \frac{\sin x}{\cos x} - \frac{1}{\sin x} \cdot \frac{1}{\cos x}$$

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

$$= \frac{-\cos^2 x}{\cos x \sin x}$$

$$= \frac{-\cos x}{\sin x}$$

$$= -\cot x$$

$$53. \csc x \tan^2 x - \sec^2 x \csc x$$

$$= \csc x (\tan^2 x - \sec^2 x)$$

$$= \csc x (-1)$$

$$= -\csc x$$

326: 69-70

$$69. \frac{\cos \theta \csc \theta}{\tan \theta}$$

$$= \frac{\left(\frac{\cos \theta}{1}\right) \left(\frac{1}{\sin \theta}\right)}{\left(\frac{\sin \theta}{\cos \theta}\right)}$$

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

$$= \cot^2 \theta$$

$$70. \frac{\sin \theta \csc \theta}{\cot \theta}$$

$$= \frac{\left(\frac{\sin \theta}{1}\right) \left(\frac{1}{\sin \theta}\right)}{\left(\frac{\cos \theta}{\sin \theta}\right)}$$

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

$$= \tan \theta$$

335: 1-3, 5, 10-13, 15

1. $\sin \theta, \cos \theta; \cot \theta = 4$ $\cos \theta > 0$ (sin must be pos.)

$$\cot^2 \theta + 1 = \csc^2 \theta$$

$$(4)^2 + 1 = \csc^2 \theta$$

$$17 = \csc^2 \theta$$

$$\pm \sqrt{17} = \csc \theta$$

$$\sin \theta = \frac{\sqrt{17}}{17}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$
$$\left(\frac{\sqrt{17}}{17}\right) 4 = \frac{\cos \theta}{\left(\frac{\sqrt{17}}{17}\right)}$$

$$\frac{4\sqrt{17}}{17} = \cos \theta$$

2. $\sec \theta, \sin \theta; \tan \theta = -\frac{2}{3}$ $\csc \theta > 0$ $\sin \rightarrow \text{pos}$
 $\cos \rightarrow \text{neg}$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$\left(-\frac{2}{3}\right)^2 + 1 = \sec^2 \theta$$

$$\frac{4}{9} + 1 = \sec^2 \theta$$

$$\frac{13}{9} = \sec^2 \theta$$

$$\pm \frac{\sqrt{13}}{3} = \sec \theta$$

$$\cos \theta = -\frac{3\sqrt{13}}{13}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$
$$\left(\frac{3\sqrt{13}}{13}\right) - \frac{2}{3} = \frac{\sin \theta}{\left(-\frac{3\sqrt{13}}{13}\right)} \cdot \left(-\frac{3\sqrt{13}}{13}\right)$$

$$+\frac{6\sqrt{13}}{39} = \sin \theta$$

$$+\frac{2\sqrt{13}}{13} = \sin \theta$$

3. $\tan \theta$, $\csc \theta$; $\cos \theta = \frac{1}{4}$, $\sin \theta > 0$
 (positive) (positive)

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

$$\left(\frac{1}{4}\right)^2 + \sin^2 \theta = 1$$

$$\sin^2 \theta = \frac{15}{16}$$

$$\sin \theta = \pm \frac{\sqrt{15}}{4}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\tan \theta = \frac{\left(\frac{\sqrt{15}}{4}\right)}{\frac{1}{4}}$$

$$\tan \theta = \sqrt{15}$$

$$\csc \theta = \frac{4\sqrt{15}}{15}$$

$$5. = \frac{\sec^2 x}{\cot^2 x + 1}$$

$$= \frac{\sec^2 x}{\csc^2 x}$$

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

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

$$10. \frac{\cos \theta}{1 + \sin \theta} - \frac{\cos \theta}{1 - \sin \theta} = -2 \tan \theta$$

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

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

$$\frac{[1 - \sin \theta - 1 - \sin \theta]}{\cos \theta}$$

$$\frac{-2 \sin \theta}{\cos \theta} = -2 \tan \theta = -2 \tan \theta \checkmark$$

$$11. \csc^2 \theta - \sin^2 \theta - \cos^2 \theta - \cot^2 \theta = 0$$

$$\csc^2 \theta - \cot^2 \theta - (\sin^2 \theta + \cos^2 \theta)$$

$$1 - 1 = 0 = 0 \quad \checkmark$$

$$12. \sin \theta + \frac{\cos \theta}{\tan \theta} = \csc \theta$$

$$\sin \theta + \frac{\left(\frac{\cos \theta}{1} \right)}{\left(\frac{\sin \theta}{\cos \theta} \right)} \quad \rightarrow$$

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

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

$$\frac{1}{\sin \theta} = \csc \theta = \csc \theta \quad \checkmark$$

$$13. \frac{\cos \theta}{1 + \sin \theta} = \sec \theta - \tan \theta$$

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

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

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

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

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

$$\sec \theta - \tan \theta = \sec \theta - \tan \theta \quad \checkmark$$

$$15. \frac{1+\sin\theta}{\sin\theta} + \frac{\sin\theta}{1-\sin\theta} = \frac{\csc\theta}{1-\sin\theta}$$

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

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

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

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