Name: _____ Class: _____

5.1 Practice: Simplifying and Solving Trig Expressions and Equations

Part 1: Simplifying Trig

1. $\cos\theta + \tan\theta \sin\theta$

$\cos\theta + \frac{\sin\theta}{\cos\theta} \cdot \sin\theta$

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

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

$= \boxed{\sec\theta}$

2. $\frac{1+\sin\theta}{\cos\theta} + \frac{\cos\theta}{1+\sin\theta}$

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

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

$\frac{2}{\cos\theta} = \boxed{2\sec\theta}$

3. $\frac{\tan\theta + \cot\theta}{\sin\theta\cos\theta}$

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

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

$\frac{1}{\sin^2\theta\cos^2\theta} = \boxed{\csc^2\theta\sec^2\theta}$

4. $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta}$

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

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

$= \boxed{2\sec^2\theta}$

5. $\frac{\sin\theta}{\cos\theta+1} + \frac{\cos\theta - 1}{\sin\theta}$

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

$\frac{1-1}{(\cos\theta+1)\sin\theta} = \frac{0}{(\cos\theta+1)\sin\theta}$

$= \boxed{0}$

6. $\frac{\cos^2\theta - \sin^2\theta}{1-\tan^2\theta}$

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

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

$= \boxed{\cos^2\theta}$

art 2: Solving Trig

7. $3\sec^2 x - 5\sec x - 2 = 0$

$3x^2 - 5x - 2 = 0$

$(3x + 1)(x - 2) = 0$

$\sec x = -\frac{1}{3}$ $\sec x = 2$

$\cos x = -3$ $\cos x = \frac{1}{2}$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

8. $2\sin^2 x - \cos x = 1$

$2(1 - \cos^2 x) - \cos x - 1 = 0$

$2 - 2\cos^2 x - \cos x - 1 = 0$

$0 = 2\cos^2 x + \cos x - 1 = 0$

$2x^2 + x - 1 = 0$

$(2x - 1)(x + 1) = 0$

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

$x = \frac{\pi}{3}, \frac{5\pi}{3}, \pi$

9. $\frac{1+\sin x}{\cos x} + \frac{\cos x}{1+\sin x} = 4$

$\frac{1 + 2\sin x + \sin^2 x + \cos^2 x}{\cos x(1+\sin x)} = 4$

$\frac{2 + 2\sin x}{\cos x(1+\sin x)} = 4 \rightarrow \frac{2(1+\sin x)}{\cos x(1+\sin x)}$

$\frac{2}{\cos x} = 4 \rightarrow 2 = 4\cos x$

$\cos x = \frac{1}{2}$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

10. $\csc^2 x - 3\csc x + 2 = 0$

$x^2 - 3x + 2 = 0$

$(x - 2)(x - 1) = 0$

$\csc x = 2$ $\csc x = 1$

$\sin x = \frac{1}{2}$ $\sin x = 1$

$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{2}$