Accelerated Pre-Calculus Name: _____

4.04 Verifying Identities Classwork Day 2 Date: _____ Period: ____

Prove the following identities.

1. $\frac{secx+1}{tanx} = \frac{sinx}{1-cosx}$

$\frac{sec x+1}{tanx} \rightarrow \frac{\frac{1}{cosx}+1}{\frac{sinx}{cosx}} \rightarrow \frac{\frac{1}{cosx}+\frac{cosx}{cosx}}{\frac{sinx}{cosx}} \rightarrow \frac{1+cosx}{cosx} \cdot \frac{cosx}{sinx}$

$\frac{1+cosx}{sinx} \cdot \frac{sinx}{sinx} = \frac{sinx(1+cosx)}{sin^2x} \rightarrow \frac{sinx(1+cosx)}{1-cos^2x} \rightarrow \frac{sinx(1+cosx)}{(1-cosx)(1+cosx)} = \boxed{\frac{sinx}{1-cosx}}$

2. $\frac{cotv-1}{cotv+1} = \frac{1-tanv}{1+tanv}$

$\frac{\frac{1}{tanv}-1}{\frac{1}{tanv}+1} \left| \frac{\frac{1}{tanv}-\frac{tanv}{tanv}}{\frac{1}{tanv}+\frac{tanv}{tanv}} = \frac{\frac{1-tanv}{tanv}}{\frac{1+tanv}{tanv}} \rightarrow \frac{1-tanv}{tanv} \cdot \frac{tanv}{1+tanv} = \boxed{\frac{1-tanv}{1+tanv}} \right.$

3. $tan^2\theta - sin^2\theta = tan^2\theta sin^2\theta$

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

4. $tan^4t + tan^2t = sec^4t - sec^2t$

$tan^2t(tan^2t+1) \left| sec^4t - sec^2t \right.$

$(sec^2t-1)(sec^2t)$

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

$(1+cos\theta)\frac{1-cos\theta}{(1+cos\theta)sin\theta} \left| \frac{1-cos^2\theta}{(1+cos\theta)(sin\theta)} = \frac{sin^2\theta}{(1+cos\theta)(sin\theta)} = \boxed{\frac{sin\theta}{1+cos\theta}} \right.$

6. $\frac{\sin t}{1+\cos t} + \frac{1+\cos t}{\sin t} = 2\csc t$

$\frac{sin^2t}{sint(1+cost)} + \frac{(1+cost)(1+cost)}{sint(1+cost)} \left| \frac{sin^2t+1+2cost+cos^2t}{sint(1+cost)} \right| \frac{2+2cost}{sint(1+cost)}$

$= \frac{1+1+2cost}{sint(1+cost)} \left| \frac{2(1+cost)}{sint(1+cost)} \right| \frac{2}{sin(t)} = \boxed{2csc(t)}$

7. $\frac{1+cosx}{1-cosx} = \frac{secx+1}{secx-1}$

$\frac{secx+1}{secx-1} = \frac{\frac{1}{cosx}+\frac{cosx}{cosx}}{\frac{1}{cosx}-\frac{cosx}{cosx}} \left| \frac{\frac{1+cosx}{cosx}}{\frac{1-cosx}{cosx}} \rightarrow \frac{1+cosx}{cosx} \cdot \frac{cosx}{1-cosx} = \boxed{\frac{1+cosx}{1-cosx}} \right.$

8. $\frac{sinAcosB+cosAsinB}{cosAcosB-sinAsinB} = \frac{tanA+tanB}{1-tanAtanB}$

$\frac{sinAcosB+sinBcosA}{cosAcosB}$

$\frac{sinAcosB+sinBcosA}{cosAcosB} \cdot \frac{cosAcosB}{cosAcosB-sinAsinB}$

$\frac{tanA+tanB}{1-tanAtanB} \rightarrow \frac{\frac{sinA}{cosA}+\frac{sinB}{cosB}}{1-\frac{sinAsinB}{cosAcosB}} \rightarrow \frac{cosAcosB-sinAsinB}{cosAcosB} = \boxed{\frac{sinAcosB+sinBcosA}{cosAcosB-sinAsinB}}$

4.04 Verifying Identities Practice

Verify the following identities.

1. $csc\theta tan\theta = sec\theta$

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

2. $\frac{\overbrace{sec^2\theta - tan^2\theta}^{1} + tan\theta}{sec\theta} = cos\theta + sin\theta$

$\frac{1 + \tan\theta}{\sec\theta} \rightarrow \frac{1}{\sec\theta} + \frac{\tan\theta}{\sec\theta}$

$\frac{1}{\sec\theta} + \frac{\sin\theta}{\cos\theta} \cdot \cos\theta$

$\frac{1}{\sec\theta} + \sin\theta$

$= \boxed{\cos\theta + \sin\theta}$

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

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

3. $\frac{\cot(-\theta)}{csc\theta} = -cos\theta$

$\frac{-\cot\theta}{\csc\theta} \rightarrow \frac{\frac{-\cos\theta}{\sin\theta}}{\frac{1}{\sin\theta}} \rightarrow \frac{-\cos\theta}{\sin\theta} \cdot \sin\theta \rightarrow \boxed{-\cos\theta}$

4. $(sec\theta - tan\theta)(csc\theta + 1) = cot\theta$

$sec\theta csc\theta + sec\theta - tan\theta csc\theta - tan\theta$

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

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

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

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

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

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

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

5. $\frac{\sin\theta}{\csc\theta} + \frac{\cos\theta}{\sec\theta} = 1$

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

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

6. $\frac{\sin\theta + \cos\theta}{\sin\theta} - \frac{\cos\theta - \sin\theta}{\cos\theta} = sec\theta csc\theta$

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

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

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