Name:_____ Date:_____

M12H Section 4.6A Solving Trigonometric Equations with Identities:

1. Given each equation below, indicate which of the following are Identities and which ones are not. State the ones that are false::

a) $\sin(a+b)=\sin a+\sin b$	b) $\cos(-x)=\cos(x)$	c) $\sin(-x)=-\sin(x)$
d) $\sin 2x=2\sin x$	e) $\dfrac{\sin 2\theta}{2}=\sin\theta$	f) $\sin 2\theta=2\sin\theta\cos\theta$
g) $\tan\theta=\dfrac{\cos\theta}{\sin\theta}$	h) $\tan\theta=\dfrac{\sin\theta}{\cos\theta}$	i) $\csc\theta=\dfrac{1}{\cos\theta}$
j) $\sin^2\theta+\cos^2\theta=1$	k) $\cos^{-1}(\theta)=\dfrac{1}{\cos\theta}$	L) $\sec\theta=\dfrac{1}{\cos\theta}$
M) $\csc(-\theta)=-\dfrac{1}{\sin\theta}$	n) $\sin(a+b)=\sin a\cos b+\sin b\cos a$	0) $\tan\theta=\dfrac{\sin\theta}{\cos\theta}$
p) $\sin 2\theta=1\rightarrow\sin\theta=\dfrac{1}{2}$	q) $\sin(a-b)=-\sin(b-a)$	r) $\sin(\pi-\theta)=\sin\theta$
s) $\cos 2\theta=1-2\sin^2\theta$	t) $\cos 4\theta=1-2\sin^2 2\theta$	u) $\sin\theta=\cos\left(\frac{\pi}{2}-\theta\right)$
v) $\sin(-\theta)+d=-\sin\theta+d$	w) $\cos(a-b)=\cos a\cos b+\sin a\sin b$	x) $\cos(a-b)=\cos a-\cos b$
y) $\sec(-\theta)=\sec\theta$	z) $\tan\left(\dfrac{a}{b}\right)=\dfrac{\tan a}{\tan b}$	aa) $\tan(a-b)=\dfrac{\sin(a-b)}{\cos(a-b)}$
Ab) $\cos^{-1}\theta=\dfrac{adj}{hyp}$	Ac) $\cos^{-1}\left(\dfrac{adj}{hyp}\right)=\theta$	Ad) $1+\cot^2\theta=\csc^2\theta$

2. Solve the following equations for $0 \le \theta \le 2\pi$. Use the trigonometric Identities shown in class. Make sure to check for extraneous roots: Show all your work and steps:

i) $\cos 2\theta = \cos^2 \theta$

ii) $\cos\theta \sin\theta = \frac{1}{4}$

iii) $\sin 2\theta = 2\cos\theta$

iv) $\cos\theta \cot 2\theta = \cos\theta$

v) $\cos\theta \tan\theta = \cos\theta$

vi) $\cot\theta = 2\sin 2\theta$

Vii) $\cos 2\theta - \cos\theta = 0$

Viii) $\cos(\theta + \pi) - \cos^2 \theta = 0$

ix) $\sin^2 \theta + 2\cos^2 \theta = \frac{7}{4}$

x) $3 - 3\csc\theta + \cot^2 \theta = 0$

xi) $2\sin^2\theta-\cos\theta-1=0$

xii) $2\sin^2\theta\cot\theta-5\sin\theta\cot\theta-3\cot\theta=0$

xiii) $3\cos^2\theta-8\cos\theta+4=0$

si) $6\sin\theta(\tan\theta)-\tan\theta-\sec\theta=0$

sii) $\cot\theta=\sin 3\theta$

siii) $8\cot\theta\cos\theta-6\sqrt{3}\cot\theta+3\csc\theta=0$

3. Find all the NPV(s) for each of the following expressions:

i) $\dfrac{\sec\theta}{2\sin\theta+1}$

ii) $\dfrac{\sin\theta\sec\theta}{\cot\theta}$

iii) $\dfrac{\sec^2\theta-1}{1+\tan^2\theta}$

iv) $\dfrac{\cos\theta}{1+\sin\theta}+\dfrac{\cot\theta}{1-\sin\theta}$

v) $\dfrac{1+\cos^2\theta-\sin\theta}{\sin\theta\cos\theta\tan\theta}$

vi) $\dfrac{\cos 2\theta-1}{3\sin 2\theta-2}$

vii) $\cot\theta(\tan\theta)(\csc\theta)\sin\theta$

viii) $\dfrac{1-\cot\theta}{1+\tan\theta}\times\dfrac{\sin\theta}{\sec\theta}$

4. Prove the following Identities. Also indicate any restrictions on the domain:

i) $\csc\theta\sin 2\theta-\sec\theta\cos 2\theta=\sec\theta$

ii) $\dfrac{\sin\theta}{1-\sin\theta}+\dfrac{\sin\theta}{1+\sin\theta}=2\sin 2\theta\sec^3\theta$

iii) $\dfrac{\tan\theta\left(\cos\theta+\cot\theta\right)}{\sec\theta+\tan\theta}=\dfrac{\sin\theta\sin 2\theta}{2-2\cos^2\theta}$

iv) $\dfrac{\cos\theta+\sin\theta\tan\theta}{\sin\theta\sec\theta}=\csc\theta$

v) $\dfrac{\tan\theta}{\sec\theta+1}=\dfrac{2\cos\theta-2\cos^2\theta}{\sin 2\theta}$

vi) $\dfrac{\sin 2\theta+\sin\theta}{1+\cos\theta+\cos 2\theta}=\cot\left(\dfrac{\pi}{2}-\theta\right)$

vii) $\left(\sec\theta-\cos\theta\right)\left(\csc\theta-\sin\theta\right)=\dfrac{\tan\theta}{1+\tan^2\theta}$

viii) $\dfrac{\sin 4\theta-\sin 2\theta}{\cos 4\theta+\cos 2\theta}=\tan\theta$

ix) $\tan 2\theta=\dfrac{2}{\cot\theta-\tan\theta}$

x) $\dfrac{\sec\theta}{1-\sin\theta}=\dfrac{1+\sin\theta}{\cos^3\theta}$