Assignment # 1

Name : ______________________

Block : __________

Pre-Calculus 12
Chapter 6 In Class Assignment

1. Prove the identity

a) $\sin^3 x + \sin x \cos^2 x = \sin x$

$\sin x(\sin^2 x + \cos^2 x)$

$\sin x(1)$

$\sin x \stackrel{\perp}{=} \sin x$

b) $\frac{\sec x}{\cot x + \tan x} = \sin x$

$$\frac{\sec x}{\frac{\cos x}{\cos x} \cdot \frac{\cos x}{\sin x} + \frac{\sin x}{\cos x} \cdot \frac{\sin x}{\sin x}}$$

$$\frac{\sec x}{\frac{\cos^2 x + \sin^2 x}{\cos x \sin x}}$$

$$\frac{\sec x}{\frac{1}{\cos x \sin x}}$$

$$\frac{1}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x} \cdot \sin x}{1}$$

$\sin x = \sin x$

c) $\frac{\cot x}{\sec x} = \frac{1 - \sin^2 x}{\sin x}$

$$\frac{\frac{\cos x}{\sin x}}{\frac{1}{\cos x}} \quad \Bigg| \quad \frac{\cos^2 x}{\sin x}$$

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

$\frac{\cos^2 x}{\sin x} \stackrel{\perp}{=}$ RHS

d) $\frac{\cot x}{\csc x - 1} = \frac{\csc x + 1}{\cot x}$

$$\frac{\cot x \,(\csc x + 1)}{(\csc x - 1)(\csc x + 1)}$$

$$\frac{\cot x(\csc x + 1)}{\csc^2 x - 1}$$

$$\frac{\cancel{\cot x}(\csc x + 1)}{\cot^{\cancel{2}} x}$$

$\frac{\csc x + 1}{\cot x} =$ RHS

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

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

$$\frac{\cancel{\sin x}\cos x}{\sin^2 x}$$

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

$$\cot x \quad = \text{RHS}$$

f) $\frac{\sin 2x}{\cos x} + \frac{\cos 2x}{\sin x} = \csc x$

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

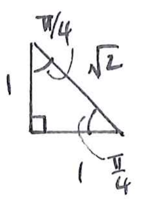
$$2\sin x + \frac{1}{\sin x} - \frac{2\sin^{\cancel{2}} x}{\cancel{\sin x}}$$

$$2\cancel{\sin x} + \csc x - 2\cancel{\sin x}$$

$$\csc x \quad = \text{RHS}$$

2. Prove the following

a) $\sin\left(\overset{A}{\frac{\pi}{4}} + \overset{B}{\theta}\right) - \sin\left(\overset{A}{\frac{\pi}{4}} - \overset{B}{\theta}\right) = \sqrt{2}\sin\theta$

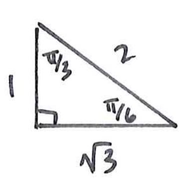


$$\sin\tfrac{\pi}{4}\cos\theta + \cos\tfrac{\pi}{4}\sin\theta - \left(\sin\tfrac{\pi}{4}\cos\theta - \cos\tfrac{\pi}{4}\sin\theta\right)$$

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

$$\frac{\sqrt{2}}{\sqrt{2}} \cdot \frac{2\sin\theta}{\sqrt{2}} = \frac{\cancel{2}\sqrt{2}}{\cancel{2}}\sin\theta = \sqrt{2}\sin\theta$$

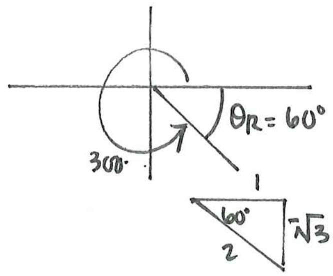
b) $\sin\left(\frac{\pi}{6} + \theta\right) + \cos\left(\frac{\pi}{3} + \theta\right) = \cos\theta$

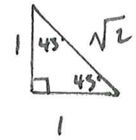


$$\sin\tfrac{\pi}{6}\cos\theta + \cos\tfrac{\pi}{6}\sin\theta + \left(\cos\tfrac{\pi}{3}\cos\theta - \sin\tfrac{\pi}{3}\sin\theta\right)$$

$$\frac{1}{2}\cos\theta + \cancel{\frac{\sqrt{3}}{2}\sin\theta} + \frac{1}{2}\cos\theta - \cancel{\frac{\sqrt{3}}{2}\sin\theta}$$

$$\cos\theta$$





3. Determine an exact value for tan 345°

$$\tan 345° = \tan(45°+300°)$$

$$= \frac{\tan 45° + \tan 300°}{1 - \tan 45° \cdot \tan 300°}$$

$$= \frac{1 + (-\sqrt{3})}{1 - (1)(-\sqrt{3})}$$

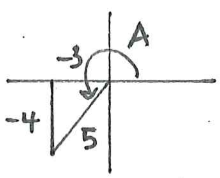
$$= \frac{(1-\sqrt{3})(1-\sqrt{3})}{(1+\sqrt{3})(1-\sqrt{3})}$$

$$= \frac{1 - \sqrt{3} - \sqrt{3} + \sqrt{9}}{1 - \sqrt{9}}$$

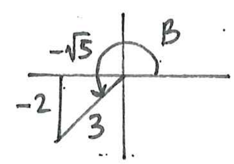
$$= \frac{1 - 2\sqrt{3} + 3}{1 - 3}$$

$$= \frac{\overset{\div -2}{4} - \overset{\div -2}{2\sqrt{3}}}{-2 \div -2}$$

$$= \frac{-2 + \sqrt{3}}{1} \quad \text{or} \quad -2+\sqrt{3}$$



4. Given that $\cos A = \frac{-3}{5}$ and $\sin B = \frac{-2}{3}$ where A and B are both in quadrant III, use identities to evaluate:



a) $\cos(A+B)$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$= \left(-\frac{3}{5}\right)\left(-\frac{\sqrt{5}}{3}\right) - \left(\frac{-4}{5}\right)\left(\frac{-2}{3}\right)$$

$$= \frac{3\sqrt{5}}{15} - \frac{8}{15}$$

$$= \frac{3\sqrt{5} - 8}{15}$$

b) $\sin(A-\pi)$

$$\sin(A-\pi) = \sin A \cos \pi - \cos A \sin \pi$$

$$= \left(\frac{-4}{5}\right)(-1) - \left(\frac{-3}{5}\right)(0)$$

$$= \frac{4}{5}$$