Classroom Examples for Pre-Calculus #14

Print out Trig Identity Sheet and give it to the class

Tips and tricks – when in doubt, turn everything into sin and cos…try to make common denominators…use conjugates…factor…look for trig identities…substitute…etc.

1)

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

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

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

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

2)

$$\frac{1+\tan x}{1-\tan x}+\frac{1+\cot x}{1-\cot x}=0$$

$$\frac{1+\frac{\sin x}{\cos x}}{1-\frac{\sin x}{\cos x}}+\frac{1+\frac{\cos x}{\sin x}}{1-\frac{\cos x}{\sin x}}=0$$

$$\frac{\frac{\cos x}{\cos x}+\frac{\sin x}{\cos x}}{\frac{\cos x}{\cos x}-\frac{\sin x}{\cos x}}+\frac{\frac{\sin x}{\sin x}+\frac{\cos x}{\sin x}}{\frac{\sin x}{\sin x}-\frac{\cos x}{\sin x}}=0$$

$$\frac{\frac{\cos x+\sin x}{\cos x}}{\frac{\cos x-\sin x}{\cos x}}+\frac{\frac{\sin x+\cos x}{\sin x}}{\frac{\sin x-\cos x}{\sin x}}=0$$

$$\frac{\cos x+\sin x}{\cos x-\sin x}+\frac{\sin x+\cos x}{\sin x-\cos x}=0$$

$$\frac{\cos x+\sin x}{\cos x-\sin x}-\frac{\sin x+\cos x}{-\sin x+\cos x}=0$$

$$\frac{\cos x+\sin x-\sin x-\cos x}{\cos x-\sin x}=0$$

$$0=0$$

$$\frac{\cos^2 y + \cot y}{\cos^2 y - \cot y} = \frac{\cos^2 y \tan y + 1}{\cos^2 y \tan y - 1}$$

$$\frac{\cos^2 y + \dfrac{\cos y}{\sin y}}{\cos^2 y - \dfrac{\cos y}{\sin y}} = \frac{\cos^2 y \tan y + 1}{\cos^2 y \tan y - 1}$$

$$\frac{\dfrac{\cos^2 y \sin y + \cos y}{\sin y}}{\dfrac{\cos^2 y \sin y - \cos y}{\sin y}} = \frac{\dfrac{\cos^2 y}{1}\dfrac{\sin y}{\cos y} + 1}{\dfrac{\cos^2 y}{1}\dfrac{\sin y}{\cos y} - 1}$$

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

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

3) $$\frac{\cos y \sin y + 1}{\cos y \sin y - 1} = \frac{\cos y \sin y + 1}{\cos y \sin y - 1}$$

$$\frac{2\tan x}{1 + \tan^2 x} = \sin 2x$$

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

$$\frac{\dfrac{2\sin x}{\cos x}}{\dfrac{\cos^2 x}{\cos^2 x} + \dfrac{\sin^2 x}{\cos^2 x}} = 2\sin x \cos x$$

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

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

4) $2\sin x \cos x = 2\sin x \cos x$

5)
$$1-\cos 5x\cos 3x-\sin 5x\sin 3x=2\sin^2 x$$
$$1-(\cos 5x\cos 3x+\sin 5x\sin 3x)=2\sin^2 x$$
$$1-\cos(5x-3x)=2\sin^2 x$$
$$1-\cos 2x=2\sin^2 x$$
$$1-(1-2\sin^2 x)=2\sin^2 x$$
$$2\sin^2 x=2\sin^2 x$$

6)
$$2\sin x\cos^3 x+2\sin^3 x\cos x=\sin 2x$$
$$2\sin x\cos x(\cos^2 x+\sin^2 x)=2\sin x\cos x$$
$$2\sin x\cos x=2\sin x\cos x$$

7)
$$\frac{\tan x-\sin x}{2\tan x}=\sin^2(\frac{x}{2})$$
$$\frac{\frac{\sin x}{\cos x}-\sin x}{\frac{2\sin x}{\cos x}}=\frac{1-\cos x}{2}$$
$$\frac{\frac{\sin x-\sin x\cos x}{\cos x}}{\frac{2\sin x}{\cos x}}=\frac{1-\cos x}{2}$$
$$\frac{\sin x-\sin x\cos x}{\cos x}\frac{\cos x}{2\sin x}=\frac{1-\cos x}{2}$$
$$\frac{\sin x(1-\cos x)}{\cos x}\frac{\cos x}{2\sin x}=\frac{1-\cos x}{2}$$
$$\frac{1-\cos x}{2}=\frac{1-\cos x}{2}$$

8)

$$\sin(x+y)\sin(x-y)=\sin^2 x-\sin^2 y$$

$$(\sin x\cos y+\cos x\sin y)(\sin x\cos y-\cos x\sin y)=\sin^2 x-\sin^2 y$$

$$\sin^2 x\cos^2 y+\sin x\cos y\sin y\cos x-\sin x\cos y\sin y\cos x-\cos^2$$

$$\sin^2 x\cos^2 y-\cos^2 x\sin^2 y=\sin^2 x-\sin^2 y$$

$$\sin^2 x(1-\sin^2 y)-(1-\sin^2 x)\sin^2 y=\sin^2 x-\sin^2 y$$

$$\sin^2 x-\sin^2 x\sin^2 y-\sin^2 y+\sin^2 x\sin^2 y=\sin^2 x-\sin^2 y$$

$$\sin^2 x-\sin^2 y=\sin^2 x-\sin^2 y$$

9)

$$\tan x(\tan x+\cot x)=\sec^2 x$$

$$\tan^2 x+\tan x\cot x=\sec^2 x$$

$$\tan^2 x+\tan x\frac{1}{\tan x}=\sec^2 x$$

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

$$\sec^2 x=\sec^2 x$$

10)

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

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

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

11)

$$\cos^2 x \cot^2 x = \cot^2 x - \cos^2 x$$

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

$$\frac{\cos^4 x}{\sin^2 x} = \frac{\cos^2 x}{\sin^2 x} - \frac{\cos^2 x \sin^2 x}{\sin^2 x}$$

$$\frac{\cos^4 x}{\sin^2 x} = \frac{\cos^2 x - \cos^2 x \sin^2 x}{\sin^2 x}$$

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

$$\frac{\cos^4 x}{\sin^2 x} = \frac{\cos^2 x \cos^2 x}{\sin^2 x}$$

$$\frac{\cos^4 x}{\sin^2 x} = \frac{\cos^4 x}{\sin^2 x}$$