Pre-Calculus Homework #15 – Answer Key

1)

$$\csc x - \cos x \cot x = \sin x$$

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

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

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

$$\sin x = \sin x$$

2)

$$(\sin\theta + \cos\theta)^2 = 1 + \sin 2\theta$$

$$\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta = 1 + \sin 2\theta$$

$$1 + 2\sin\theta\cos\theta = 1 + \sin 2\theta$$

$$1 + \sin 2\theta = 1 + \sin 2\theta$$

3)

$$(\csc\alpha + \cot\alpha)^2 = \frac{1+\cos\alpha}{1-\cos\alpha}$$

$$\left(\frac{1}{\sin\alpha} + \frac{\cos\alpha}{\sin\alpha}\right)^2 = \frac{1+\cos\alpha}{1-\cos\alpha} \bullet \frac{1+\cos\alpha}{1+\cos\alpha}$$

$$\left(\frac{1+\cos\alpha}{\sin\alpha}\right)^2 = \frac{(1+\cos\alpha)^2}{1-\cos^2\alpha}$$

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

4)

$$\frac{1+\sin\beta}{1+\csc\beta} = \frac{\tan\beta}{\sec\beta}$$

$$\frac{1+\sin\beta}{1+\frac{1}{\sin\beta}} = \frac{\frac{\sin\beta}{\cos\beta}}{\frac{1}{\cos\beta}}$$

$$\frac{1+\sin\beta}{\frac{\sin\beta+1}{\sin\beta}} = \frac{\sin\beta}{\cos\beta} \bullet \frac{\cos\beta}{1}$$

$$\frac{1+\sin\beta}{1} \bullet \frac{\sin\beta}{\sin\beta+1} = \sin\beta$$

$$\sin\beta = \sin\beta$$

5)

$$\frac{\tan y+\sin y}{2\tan y}=\cos^2\left(\frac{y}{2}\right)$$

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

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

$$\frac{\sin y(1+\cos y)}{\cos y}\bullet\frac{\cos y}{2\sin y}=\frac{1+\cos y}{2}$$

$$\frac{1+\cos y}{2}=\frac{1+\cos y}{2}$$

6) $\theta=30^\circ,150^\circ,210^\circ,330^\circ$

7) $\frac{\sqrt{6}+\sqrt{2}}{4}$ or $\frac{\sqrt{2+\sqrt{3}}}{2}$

8) $\theta=0,\frac{2\pi}{3},\pi,\frac{4\pi}{3}$

9) $-2-\sqrt{3}$ or $-\sqrt{7+4\sqrt{3}}$

10) $\theta=0^\circ,90^\circ,180^\circ,270^\circ$

11) $\frac{\sqrt{\sqrt{2}+2}}{2}$

12) $\theta=0,\frac{\pi}{2},\pi,\frac{3\pi}{2}$

13) $2+\sqrt{3}$ or $\sqrt{7+4\sqrt{3}}$

14) $\theta=135^\circ,315^\circ$

15) $\frac{-\sqrt{2-\sqrt{2}}}{2}$

16) $\theta=\frac{\pi}{6},\frac{\pi}{2},\frac{5\pi}{6},\frac{7\pi}{6},\frac{3\pi}{2},\frac{11\pi}{6}$

17) $\sin 2\theta=\frac{24}{25}$ $\cos 2\theta=\frac{-7}{25}$ $\tan 2\theta=\frac{-24}{7}$ quadrant II

18) $\theta=63.435^\circ,104.036^\circ,243.435^\circ,284.036^\circ$

19) $\sin 2\theta=\frac{-240}{289}$ $\cos 2\theta=\frac{-161}{289}$ $\tan 2\theta=\frac{240}{161}$ quadrant III

20) $\theta=1.571,\ 4.261,\ 5.163$