Pre-Calculus Homework #14 – Answer Key

1) angle C = $39^\circ 53' 48''$, side b = 84.9, side a = 42.5, and the area = 1,157.8
2) 2,622.5 miles
3) angle C = $95^\circ 4' 25.0''$, angle B = $57^\circ 18' 2.6''$, angle A = $27^\circ 37' 32.4''$, and the area = 658.9
4) 22.6 miles $S37.4^\circ E$
5) angle A = 41.5°, angle B = 102.9°, side b = 60.3, and the area = 719.4
   angle A = 138.5°, angle B = 5.9°, side b = 6.4, and the area = 75.9
6)

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

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

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

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

7)

$$\frac{1+\tan\theta}{1+\cot\theta}=\frac{\sec\theta}{\csc\theta}$$

$$\frac{1+\dfrac{\sin\theta}{\cos\theta}}{1+\dfrac{\cos\theta}{\sin\theta}}=\frac{\dfrac{1}{\cos\theta}}{\dfrac{1}{\sin\theta}}$$

$$\frac{\dfrac{\cos\theta+\sin\theta}{\cos\theta}}{\dfrac{\sin\theta+\cos\theta}{\sin\theta}}=\frac{\dfrac{1}{\cos\theta}}{\dfrac{1}{\sin\theta}}$$

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

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

8)

$$\frac{\sin y+\cos y}{\sec y+\csc y}=\frac{\sin y}{\sec y}$$

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

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

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

$$\sin y\cos y=\sin y\cos y$$

9)

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

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

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

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

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

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

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

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

10)

$$\tan x + \cot y = \frac{\cos(x-y)}{\cos x \sin y}$$

$$\tan x + \cot y = \frac{\cos x \cos y + \sin x \sin y}{\cos x \sin y}$$

$$\tan x + \cot y = \frac{\cos x \cos y}{\cos x \sin y} + \frac{\sin x \sin y}{\cos x \sin y}$$

$$\tan x + \cot y = \frac{\cos y}{\sin y} + \frac{\sin x}{\cos x}$$

$$\tan x + \cot y = \tan x + \cot y$$

11)

$$\cos 2\theta = \cos^4 \theta - \sin^4 \theta$$

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

$$\cos 2\theta = (\cos^2 \theta - \sin^2 \theta)$$

$$\cos 2\theta = \cos 2\theta$$

12)

$$\frac{2\tan x}{1-\tan^2 x} = \frac{\tan 3x - \tan x}{1+\tan 3x \tan x}$$

$$\frac{2\tan x}{1-\tan^2 x} = \tan(3x - x)$$

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

$$\frac{2\tan x}{1-\tan^2 x} = \frac{2\tan x}{1-\tan^2 x}$$

13)

$$\frac{2+\sin 2\theta}{2} = \frac{\cos^3 \theta - \sin^3 \theta}{\cos \theta - \sin \theta}$$

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

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

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

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

14)

$$-\sin^2\beta = \cos^2\beta(1-\sec^2\beta)$$

$$-\sin^2\beta = \cos^2\beta(-\tan^2\beta)$$

$$-\sin^2\beta = \cos^2\beta(-\frac{\sin^2\beta}{\cos^2\beta})$$

$$-\sin^2\beta = -\sin^2\beta$$

15)

$$1+\tan\alpha = \frac{\cos\alpha+\sin\alpha}{\cos\alpha}$$

$$1+\tan\alpha = \frac{\cos\alpha}{\cos\alpha}+\frac{\sin\alpha}{\cos\alpha}$$

$$1+\tan\alpha = 1+\tan\alpha$$

16)

$$\frac{\tan\theta+\cot\theta}{\csc\theta} = \sec\theta$$

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

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

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

$$\frac{1}{\cos\theta} = \sec\theta$$

$$\sec\theta = \sec\theta$$

17)

$$(\sec\beta-\csc\beta)(\sin\beta+\cos\beta) = \tan\beta-\cot\beta$$

$$(\sec\beta-\csc\beta)(\sin\beta+\cos\beta) = \frac{\sin\beta}{\cos\beta}-\frac{\cos\beta}{\sin\beta}$$

$$(\sec\beta-\csc\beta)(\sin\beta+\cos\beta) = \frac{\sin^2\beta-\cos^2\beta}{\cos\beta\sin\beta}$$

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

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

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

18)

$$\frac{\tan y+\cot y}{\sec y+\csc y}=\frac{1}{\cos y+\sin y}$$

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

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

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

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

19)

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

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

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

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

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

20)

$$\sec^4\beta-\tan^2\beta=\tan^4\beta+\sec^2\beta$$

$$\sec^4\beta-(\sec^2\beta-1)=\tan^4\beta+\sec^2\beta$$

$$\sec^4\beta-\sec^2\beta+1=\tan^4\beta+\sec^2\beta$$

$$\sec^4\beta-\sec^2\beta+1=(\tan^2\beta)^2+\sec^2\beta$$

$$\sec^4\beta-\sec^2\beta+1=(\sec^2\beta-1)^2+\sec^2\beta$$

$$\sec^4\beta-\sec^2\beta+1=\sec^4\beta-2\sec^2\beta+1+\sec^2\beta$$

$$\sec^4\beta-\sec^2\beta+1=\sec^4\beta-\sec^2\beta+1$$