Math 1613 - Trigonometry

Quiz #15 - 2011.10.06

Solutions

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1. In many of the double angle identities, we have a $\pm$ sign. For instance,

$$\sin\left(\frac{A}{2}\right) = \pm\sqrt{\frac{1-\cos(A)}{2}}$$

What determines whether we use the $+$ versus the $-$?

We simply have to determine which quadrant the angle $\frac{A}{2}$ is in since the square root itself is positive.

2. Find two angles θ that make the following statement true:

$$\sin(\theta) = \cos\left(2\theta - \frac{\pi}{12}\right)$$

First, we replace θ with $\theta + 2\pi k$, which will allow us to find multiple angles:

$$\sin(\theta + 2\pi k) = \cos\left(2(\theta + 2\pi k) - \frac{\pi}{12}\right)$$

Then we use the cofunction identity $\cos(A) = \sin\left(\frac{\pi}{2} - A\right)$ to get

$$\sin(\theta + 2\pi k) = \sin\left(\frac{\pi}{2} - 2(\theta + 2\pi k) + \frac{\pi}{12}\right)$$

Now we simply set the arguments equal:

$$\theta + 2\pi k = \frac{7\pi}{12} - 4\pi k - 2\theta$$

and solving for θ gives

$$\theta = \frac{7 - 72k}{36}\pi$$

When $k = 0$, we have $\theta = \frac{7}{36}\pi$, and any other value of k would work as well, for instance, if $k = -1$, $\theta = \frac{79}{36}\pi$.