

Trigonometric functions

Spring Semester, 2007

When solving problems involving trigonometric functions, keep in mind the following manuals.

1. Know the basic properties (domain and the graph...) of trigonometric functions.
2. Sketch the graph to understand questions.
3. Use proper substitutions and check your solutions.
4. Apply some basic identities.
5. You may use any knowledge you learned in the class.

Example 1. Find the exact value of

$$\sin^{-1}\left(\frac{\sqrt{2}}{2}\right).$$

Solution)

Example 2. Find the exact value of

$$\sin^{-1}\left[\cos\frac{\pi}{4}\right].$$

Solution)

Example 3. Establish the identity:

$$\tan \theta + \frac{\cos \theta}{1 - \cos \theta} = \sec \theta.$$

Solution)

Example 4. Rewrite over a common denominator.

$$\frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta}.$$

Solution)

Example 5. Establish the identity:

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

Solution).

Example 6. Let $\sin \theta = 0.2$. Then find the value of

$$\sin\left(\theta + \frac{\pi}{6}\right).$$

Solution).

Example 7. Suppose the following:

$$\sin \alpha = \frac{5}{13}, \frac{\pi}{2} < \alpha < \pi; \tan \beta = \sqrt{3}, 0 < \beta < \frac{\pi}{2}.$$

Then find exact the value of

$$\cos(\alpha + \beta).$$

Solution).

Example 8. Solve the equation on the interval $0 \leq \theta < 2\pi$.

$$\cos(2\theta) = \frac{1}{2}.$$

Solution).

Example 9. Solve the equation on the interval $0 \leq \theta < 2\pi$.

$$2 \sin^2 \theta = 3(1 - \cos \theta).$$

Solution).