Math 150 Lecture Notes
Trigonometric Equations

To solve a trigonometric equation:

1. Use rules of algebra to isolate the trig function on one side of the equal sign.
2. Use knowledge of the values of the trig functions to solve for the variable.

Example 1: Find all solutions of each equation.

$\sin x + 1 = 0$ $\quad$ $1 - \tan^2 x = 0$ $\quad$ $\cos 3x = \sin 3x$

$\tan^5 x = 9 \tan x$ $\quad$ $4 \sin x \cos x + 2 \sin x - 2 \cos x = 1$

Example 2: Find all solutions of each equation in the interval $[0, 2\pi)$.

$\tan x = 3 \cot x$ $\quad$ $2 \sin^2 x = \cos x + 1$ $\quad$ $3 \csc^2 x = 4$

Example 3: (a) Find all solutions of the equation. (b) Use a calculator to solve the equation in the interval $[0, 2\pi)$, correct to four decimal places.

$3 \tan x = 15$ $3 \sin 2x = 1$ $2 \sin 2x = \cos x$

Example 4: Use an addition or subtraction formula to simplify the equation. Then find all solutions in the interval $[0, 2\pi)$.

$\cos x \cos 2x + \sin x \sin 2x = ½$

Example 5: Use a double- or half-angle formula to solve the equation in the interval $[0, 2\pi)$.

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