# 7.5 Solving Linear Trigonometric Equations

<table>
<thead>
<tr>
<th><strong>A Elementary Trigonometric Equations</strong></th>
<th><strong>B Simple Trigonometric Equations</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the unit circle to solve elementary trigonometric equations (see Ex 1).</td>
<td>Use the related angle to find the solutions of simple trigonometric equations (see Ex 2).</td>
</tr>
</tbody>
</table>

**Ex 1. Solve the following trigonometric equations.**

- a) \( \sin x = 0 \)
- b) \( \sin x = 1 \)
- c) \( \sin x = -1 \)
- d) \( \cos x = 0 \)
- e) \( \cos x = 1 \)
- f) \( \cos = -1 \)
- g) \( \tan x = 0 \)
- h) \( \tan x = 1 \)
- i) \( \tan x = -1 \)

**Ex 2. Solve the following trigonometric equations.**

- a) \( \sin x = \frac{1}{2} \)
- b) \( \sin x = -\frac{\sqrt{2}}{2} \)
- c) \( \cos x = -\frac{1}{2} \)
- d) \( \cos x = \frac{\sqrt{3}}{2} \)
- e) \( \tan x = \sqrt{3} \)
- f) \( \tan x = -\frac{1}{\sqrt{3}} \)
- g) \( \sin x = \cos x \)

**C Factoring**

Some trigonometric equations can be solved by factoring.

**Ex 3. Solve the following trigonometric equations.**

- a) \( \sin x \cos x = 0 \)
- b) \( \sqrt{3} \tan x + \tan^2 x = 0 \)
# D Trigonometric Identities

Some trigonometric equations can be solved by using trigonometric identities.

Ex 4. Solve the following trigonometric equations.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>a)</td>
<td>$\sin x + \cos x = 1$</td>
</tr>
<tr>
<td>b)</td>
<td>$\sin 2x + \sin x = 0$</td>
</tr>
</tbody>
</table>

# E Restricted Solutions

Some trigonometric equations may have solutions restricted to specific intervals.

Ex 5. Solve the following trigonometric equations.

<p>| | |</p>
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<tbody>
<tr>
<td>a)</td>
<td>$2 \sin 3x - 1 = 0, \quad 0 \leq x \leq 2\pi$</td>
</tr>
<tr>
<td>b)</td>
<td>$2 \sin^2 x - 1 = 0, \quad -\pi &lt; x &lt; 2\pi$</td>
</tr>
<tr>
<td>c)</td>
<td>$4 \sin x \cos x = \sqrt{3}, \quad 0 \leq x \leq 2\pi$</td>
</tr>
<tr>
<td>d)</td>
<td>$1 + \sqrt{3} \tan \left(\frac{2x - \pi}{3}\right) = 0, \quad 0 \leq x \leq 2\pi$</td>
</tr>
</tbody>
</table>

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**Reading**: Nelson Textbook, Pages 419-426

**Homework**: Nelson Textbook, Page 427: #6, 9, 10, 13, 14, 17, 18

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