

Trigonometric Equations 20

Sometimes, an equation involving trigonometric functions must be factored in order to solve it.

Example 1:

Solve the equation; $\cos^2x + \cosx = 0$ for $0 \leq x < 360$

$$\cosx(\cosx + 1) = 0$$

$$\cosx = 0, \text{ or } \cosx = -1 \quad x = 90^\circ, 180^\circ, 270^\circ.$$

Example 2:

Solve the equation; $2\sin^2x - 3\sinx - 2 = 0$ for $0 \leq x < 360$

$$\text{let } y = \sinx$$

$$2y^2 - 3y - 2 = 0$$

$$(2y + 1)(y - 2) = 0$$

$$y = -1/2, 2$$

$$\sinx = -1/2, 2$$

$$\sinx = 2 \text{ has no solution}$$

$$\sinx = -1/2 \text{ has solutions, } x = 210^\circ, 330^\circ.$$

Problems:

1) Solve the following equations for $0 \leq x < 360$

a) $(\sinx)(\cosx) = 0$

b) $\sin^2x - \sinx = 0$

c) $\cos^2x - 1 = 0$

d) $2\cos^2x + \cosx - 1 = 0$

e) $2\sin^2x - 3\sin x + 1 = 0$

f) $\cos x = \sin x$

g) $2\cos^2x = \cos x$

h) $\tan^3x - 3\tan x = 0$

i) $\cos^2x - \cos x - 2 = 0$

j) $4\sin x + \csc x = 4$

Answers:

1)a) $0^\circ, 90^\circ, 180^\circ, 270^\circ$, b) $0^\circ, 90^\circ, 180^\circ$, c) $0^\circ, 180^\circ$, d) $60^\circ, 180^\circ, 300^\circ$, e) $30^\circ, 90^\circ, 150^\circ$, f) $45^\circ, 225^\circ$, g) $60^\circ, 90^\circ, 270^\circ, 300^\circ$, h) $0^\circ, 60^\circ, 120^\circ, 180^\circ, 240^\circ, 300^\circ$, i) 180° , j) $30^\circ, 150^\circ$.