

Worksheet #54

Answers

- 1) $5 \sin^2 x + 3 \cos x = 3$
 $5(1 - \cos^2 x) + 3 \cos x = 3$
 $5 - 5\cos^2 x + 3 \cos x - 3 = 0$
 $5 \cos^2 x - 3 \cos x - 2 = 0$
 $(5 \cos x + 2)(\cos x - 1) = 0$
 $\cos x = -2/5 \quad \cos x = 1$
 $x = 180^\circ - 66^\circ \quad x = 0$
 $x = 180^\circ + 66^\circ$
 $x = \{0, 114^\circ, 246^\circ\}$
- 2) $\sec^2 x + \tan x - 7 = 0$
 $1 + \tan^2 x + \tan x - 7 = 0$
 $\tan^2 x + \tan x - 6 = 0$
 $(\tan x + 3)(\tan x - 2) = 0$
 $\tan x = -3 \quad \tan x = 2$
 $x = 180^\circ - 72^\circ \quad x = 63^\circ$
 $x = 360^\circ - 72^\circ \quad x = 180^\circ + 63^\circ$
 $x = \{63^\circ, 108^\circ, 243^\circ, 252^\circ\}$
- 3) $5 \cos x + 4 = \sec x$
 $5 \cos x + 4 = 1/(\cos x)$
 $5 \cos^2 x + 4 \cos x = 1$
 $5 \cos^2 x + 4 \cos x - 1 = 0$
 $(5 \cos x - 1)(\cos x + 1) = 0$
 $\cos x = 1/5 \quad \cos x = -1$
 $x = 78^\circ \quad x = 180^\circ$
 $x = 360^\circ - 78^\circ$
 $x = \{78^\circ, 180^\circ, 282^\circ\}$
- 4) $3 \cos 2x + 5 \cos x + 2 = 0$
 $3(2 \cos^2 x - 1) + 5 \cos x + 2 = 0$
 $6 \cos^2 x - 3 + 5 \cos x + 2 = 0$
 $6 \cos^2 x + 5 \cos x - 1 = 0$
 $(6 \cos x - 1)(\cos x - 1) = 0$
 $\cos x = 1/6 \quad \cos x = -1$
 $x = 80^\circ \quad x = 180^\circ$
 $x = 360^\circ - 80^\circ$
 $x = \{80^\circ, 180^\circ, 280^\circ\}$
- 5) $2 \cos 2x + \cos x = 0$
 $2(2 \cos^2 x - 1) + \cos x = 0$
 $4 \cos^2 x + \cos x - 2 = 0$
 $\cos x = \frac{-1 \pm \sqrt{1 - (4)(4)(-2)}}{(2)(4)}$
 $\cos x = \frac{-1 \pm \sqrt{33}}{8}$
 $\cos x = 0.5931 \quad \cos x = -0.8431$
 $x = 54^\circ \quad x = 180^\circ - 33^\circ$
 $x = 360^\circ - 54^\circ \quad x = 180^\circ + 33^\circ$
 $x = \{54^\circ, 147^\circ, 213^\circ, 306^\circ\}$
- 6) $\cos 2A = \cos^2 A - \sin^2 A$
 $\cos(A + A) = \cos A \cos A - \sin A \sin A$
 $= \cos^2 A - \sin^2 A$
- 7) $\cos 2A = 2 \cos^2 A - 1$
 $\cos(A + A) = \cos A \cos A - \sin A \sin A$
 $= \cos^2 A - \sin^2 A$
 $= \cos^2 A - (1 - \cos^2 A)$
 $= \cos^2 A - 1 + \cos^2 A$
 $= 2 \cos^2 A - 1$
- 8) $\cos 2A = 2 \sin^2 A - 1$
 $\cos(A + A) = \cos A \cos A - \sin A \sin A$
 $= \cos^2 A - \sin^2 A$
 $= (1 - \sin^2 A) - \sin^2 A$
 $= 1 - 2 \sin^2 A$