IQ ACADEMY

Exercise set (1.1)

SECTION 1.1 Exercises

In Exercises 1–6, determine whether the equation is linear in the variables x and y.

2. $3x - 4xy = 0$

not linear

3. $\frac{3}{y} + \frac{2}{x} - 1 = 0$

not linear

4. $x^2 + y^2 = 4$

not linear

5. $2 \sin x - y = 14$

not linear

6. $(\sin 2)x - y = 14$

linear

In Exercises 11–16, use back-substitution to solve the system.

12. $2x_1 - 4x_2 = 6$
$3x_2 = 9$

$\frac{3}{3}X_2 = \frac{9}{3} \rightarrow \boxed{X_2 = 3}$

$2X_1 - 4(3) = 6 \rightarrow 2X_1 - 12 = 6$

$2X_1 = 18 \rightarrow \boxed{X_1 = 9}$

13. $-x + y - z = 0$
$2y + z = 3$
$\frac{1}{2}z = 0$

$\frac{1}{2}Z = 0 \rightarrow Z = 0$

$2Y + 0 = 3$

$2Y = 3 \rightarrow \boxed{Y = \frac{3}{2}}$

$-X + \frac{3}{2} - 0 = 0$

$\boxed{X = \frac{3}{2}}$

In Exercises 37–56, solve the system of linear equations.

37. $x_1 - x_2 = 0$

$3x_1 - 2x_2 = -1$

$X_1 = X_2$

$3X_2 - 2X_2 = -1 \rightarrow X_2 = -1$

39. $2u + v = 120$
$u + 2v = 120$

$2w + v = 120$

$2w + 4v = 240$

$0 - 3v = -120$

$v = \frac{-120}{-3}$

$v = 40$

use $v = 40$ in equation ②

$w + 2(40) = 120$

$w = 120 - 80$

$\boxed{w = 40}$

42. $\frac{2}{3}x_1 + \frac{1}{6}x_2 = 0$

$4x_1 + x_2 = 0$

$6 \cdot \frac{2}{3} X_1 + 6 \cdot \frac{1}{6} X_2 = 0 \rightarrow 4X_1 + X_2 = 0$

$4X_1 + X_2 = 0$

$X_2 = -4X_1 \qquad w = X_1$

$X_2 = -4w$

$w = X_1$

47. $x + y + z = 6$
$2x - y + z = 3$
$3x \quad - z = 0$

$X + Y + Z = 6$

$3Y + Z = 9$

$3X \quad - Z = 0$

Subtract 2 times the first equation from the second equation produced new second equation

$X + Y + Z = 6$

$Y + \frac{Z}{3} = 3$

$3X \quad - Z = 0$

Multiplay the second equation by 1/3 produced new second equation

$X + Y + Z = 6$

$Y + \frac{Z}{3} = 3$

$3Y + 4Z = 18$

Subtract 3 times first equation from the third equation produced new third equation

$X + Y + Z = 6$

$Y + \frac{Z}{3} = 3$

$-3Z = -9$

Subtract 3 times the second equation from the third equation produced new third equation

$\boxed{Z = 3}$

$Y + \frac{3}{3} = 3 \rightarrow Y = 3 - 1 \rightarrow \boxed{Y = 2}$

$X + 2 + 3 = 6 \rightarrow X = 6 - 5 \rightarrow \boxed{X = 1}$