9.2 Systems of Equations

These problems taken from the Nelson Text: Pg. 507 – 509

3. Determine whether $x = -7$, $y = 5$, and $z = \frac{3}{4}$ is a solution to the following systems:

a. ① $x - 3y + 4z = -19$
   ② $\quad x - 8z = -13$
   ③ $\quad x + 2y = 3$

b. ① $3x - 2y + 16z = -19$
   ② $\quad 3x - 2y = -23$
   ③ $\quad 8x - y + 4z = -58$

8. a. Determine a linear equation that has $x = t$, $y = -2t - 11$, $t \in \mathbf{R}$, as its general solution.
   b. Show that $x = 3t + 3$, $y = -6t - 17$, $t \in \mathbf{R}$, is also a general solution to the linear equation found in part a.

9. Determine the value(s) of the constant k for which the following system of equations has

a. no solutions
b. one solution
c. infinitely many solutions

① $\quad x + y = 6$
② $2x + 2y = k$

12. Solve each system of equations using elementary operations.

a. ① $x + y + z = 0$
   ② $\quad x - y = 1$
   ③ $\quad y - z = -5$

d. ① $\dfrac{x}{3} + \dfrac{y}{4} + \dfrac{z}{5} = 14$
   ② $\dfrac{x}{4} + \dfrac{y}{5} + \dfrac{z}{3} = -21$
   ③ $\dfrac{x}{5} + \dfrac{y}{3} + \dfrac{z}{4} = 7$

b. ① $2x - 3y + z = 6$
   ② $x + y + 2z = 31$
   ③ $x - 2y - z = -17$

e. ① $2x - y = 0$
   ② $2y - z = 7$
   ③ $2z - x = 0$

c. ① $x + y = 10$
   ② $y + z = -2$
   ③ $x + z = -4$

f. ① $x + y + 2z = 13$
   ② $\quad 2y - 3z = -12$
   ③ $x - y + 4z = 19$

14. Determine the solution to the following system of equations:

① $x + y + z = a$

② $\quad\quad x + y = b$

③ $\quad\quad y + z = c$

Answers

3. **a.** yes
   b. no
8. **a.** $2x + y = -11$
   b. $2x + y = -11$
   $\quad 2(3t + 3) + (-6t - 17) =$
   $\quad 6t - 6t + 6 - 17 = -11$
9. **a.** $k \neq 12$
   b. not possible
   c. $k = 12$
12. **a.** $(-1, -2, 3)$
   b. $(3, 4, 12)$
   c. $(4, 6, -8)$
   d. $(60, 120, -180)$
   e. $(2, 4, 1)$
   f. $(-2, 3, 6)$
14. $(a - c, -a + b + c, a - b)$