A.REI.C.6: Solving Linear Systems 3

1. For the system shown below, what is the value of \( z \)?
   \[
   y = -2x + 14 \\
   3x - 4z = 2 \\
   3x - y = 16
   \]
   1) 5 
   2) 2 
   3) 6 
   4) 4 

2. Consider the system of equations below:
   \[
   x + y - z = 6 \\
   2x - 3y + 2z = -19 \\
   -x + 4y - z = 17
   \]
   Which number is not the value of any variable in the solution of the system?
   1) -1 
   2) 2 
   3) 3 
   4) -4 

3. Which value is not contained in the solution of the system shown below?
   \[
   a + 5b - c = -20 \\
   4a - 5b + 4c = 19 \\
   -a - 5b - 5c = 2
   \]
   1) -2 
   2) 2 
   3) 3 
   4) -3 

4. Solve the following system of equations algebraically for all values of \( x \), \( y \), and \( z \):
   \[
   x + 3y + 5z = 45 \\
   6x - 3y + 2z = -10 \\
   -2x + 3y + 8z = 72
   \]

5. Solve the following system of equations algebraically for all values of \( a \), \( b \), and \( c \).
   \[
   a + 4b + 6c = 23 \\
   a + 2b + c = 2 \\
   6b + 2c = a + 14
   \]

6. Solve the following system of equations algebraically for all values of \( x \), \( y \), and \( z \):
   \[
   x + y + z = 1 \\
   2x + 4y + 6z = 2 \\
   -x + 3y - 5z = 11
   \]

7. Solve the following system of equations algebraically for all values of \( x \), \( y \), and \( z \):
   \[
   2x + 3y - 4z = -1 \\
   x - 2y + 5z = 3 \\
   -4x + y + z = 16
   \]

8. Seth has one less than twice the number of compact discs (CDs) that Jason has. Raoul has 53 more CDs than Jason has. If Seth gives Jason 25 CDs, Seth and Jason will have the same number of CDs. How many CDs did each of the three boys have to begin with?
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Answer Section

1 ANS: 4

\[3x - (-2x + 14) = 16 \quad 3(6) - 4z = 2\]

\[5x = 30 \quad -4z = -16\]

\[x = 6 \quad z = 4\]

REF: 011803aii

2 ANS: 2

\[x + y - z = 6 \quad 2x + 2y - 2z = 12 \quad 5y - 4z = 31 \quad 5y - 2(-4) = 23 \quad x + 3 - (-4) = 6\]

\[-x + 4y - z = 17 \quad 2x - 3y + 2z = -19 \quad 5y - 2z = 23 \quad 5y = 15 \quad x = -1\]

\[5y - 2z = 23 \quad 5y - 4z = 31 \quad -2z = 8 \quad y = 3\]

\[z = -4\]

REF: 061923aii

3 ANS: 2

Combining (1) and (3): \[-6c = -18\] Combining (1) and (2): \[5a + 3c = -1\] Using (3): \[-(2) - 5b - 5(3) = 2\]

\[c = 3 \quad 5a + 3(3) = -1 \quad 2 - 5b - 15 = 2\]

\[5a = -10 \quad b = -3\]

\[a = -2\]

REF: 081623aii

4 ANS:

\[6x - 3y + 2z = -10 \quad x + 3y + 5z = 45 \quad 4x + 10z = 62 \quad 4x + 4(7) = 20 \quad 6(-2) - 3y + 2(7) = -10\]

\[-2x + 3y + 8z = 72 \quad 6x - 3y + 2z = -10 \quad 4x + 4z = 20 \quad 4x = -8 \quad -3y = -12\]

\[4x + 10z = 62 \quad 7x + 7z = 35 \quad 6z = 42 \quad x = -2 \quad y = 4\]

\[4x + 4z = 20 \quad z = 7\]

REF: spr1510aii

5 ANS:

\[a + 4b + 6c = 23 \quad a + 2b + c = 2 \quad 8b + 3c = 16 \quad 2b + 5(4) = 21 \quad a + 4\left(\frac{1}{2}\right) + 6(4) = 23\]

\[a + 2b + c = 2 \quad -a + 6b + 2c = 14 \quad 8b + 20c = 84\]

\[2b + 5c = 21 \quad 8b + 3c = 16 \quad 17c = 68 \quad b = \frac{1}{2} \quad a + 2 + 24 = 23\]

\[c = 4 \quad b = \frac{1}{2} \quad a = -3\]

REF: 011933aii
6 ANS:
\[
\begin{align*}
 x + y + z &= 1 & x + y + z &= 1 & x + y + z &= 1 & -2z - z &= 3 & y - 1 &= 3 & x + 2 - 1 &= 1 \\
 x + 2y + 3z &= 1 & x + 2y + 3z &= 1 & -x + 3y - 5z &= 11 & -3z &= 3 & y &= 2 & x &= 0 \\
-x + 3y - 5z &= 11 & y + 2z &= 0 & 4y - 4z &= 12 & z &= -1 \\
 & y = -2z & y - z &= 3 \\
\end{align*}
\]

REF: 061733a

7 ANS:
\[
\begin{align*}
 4x + 6y - 8z &= -2 & 4x + 6y - 8z &= -2 & 4x - 8y + 20z &= 12 & z + 2 &= 3z - 4 & y = 3 + 2 & 4x + 5 + 3 &= 16 \\
 4x - 8y + 20z &= 12 & 4x + y + z &= 16 & -4x + y + z &= 16 & 6 &= 2z & = 5 & -4x &= 8 \\
-4x + y + z &= 16 & 7y - 7z &= 14 & -7y + 21z &= 28 & z &= 3 & x &= -2 \\
 & y - z &= 2 & y - 3z &= -4 \\
 & y &= 3z - 4 \\
\end{align*}
\]

REF: 081833a

8 ANS:
\[
\begin{align*}
 s &= 2j - 1 & s - 25 &= j + 25 & r &= j + 53 & s &= 2j - 1 \\
 Seth &= 101, Jason &= 51, Raoul &= 104. \\
 r &= j + 53. & (2j - 1) &= j + 50. & r &= (51) + 53. & s &= 2(51) - 1 \\
 s - 25 &= j + 25 & j &= 51 & r &= 104 & s &= 101 \\
\end{align*}
\]

REF: 060326a