Exercise 1.2.17 *Determine if the system is consistent. If so, is the solution unique?*

$$\begin{aligned} x+2y+z-w&=2\\ x-y+z+w&=1\\ 2x+y-z&=1\\ 4x+2y+z&=5 \end{aligned}$$

Exercise 1.2.18 *Determine if the system is consistent. If so, is the solution unique?*

$$\begin{aligned} x+2y+z-w&=2\\ x-y+z+w&=0\\ 2x+y-z&=1\\ 4x+2y+z&=3 \end{aligned}$$

Exercise 1.2.20 *Row reduce the following matrix to obtain the row-echelon form. Then continue to obtain the reduced row-echelon form.*

$$\begin{bmatrix} 2 & -1 & 3 & -1 \\ 1 & 0 & 2 & 1 \\ 1 & -1 & 1 & -2 \end{bmatrix}$$

Exercise 1.2.21 *Row reduce the following matrix to obtain the row-echelon form. Then continue to obtain the reduced row-echelon form.*

$$\begin{bmatrix} 0 & 0 & -1 & -1 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 0 & -1 \end{bmatrix}$$

Exercise 1.2.22 *Row reduce the following matrix to obtain the row-echelon form. Then continue to obtain the reduced row-echelon form.*

$$\begin{bmatrix} 3 & -6 & -7 & -8 \\ 1 & -2 & -2 & -2 \\ 1 & -2 & -3 & -4 \end{bmatrix}$$

Exercise 1.2.23 *Row reduce the following matrix to obtain the row-echelon form. Then continue to obtain the reduced row-echelon form.*

$$\begin{bmatrix} 2 & 4 & 5 & 15 \\ 1 & 2 & 3 & 9 \\ 1 & 2 & 2 & 6 \end{bmatrix}$$

Exercise 1.2.24 *Row reduce the following matrix to obtain the row-echelon form. Then continue to obtain the reduced row-echelon form.*

$$\begin{bmatrix} 4 & -1 & 7 & 10 \\ 1 & 0 & 3 & 3 \\ 1 & -1 & -2 & 1 \end{bmatrix}$$

Exercise 1.2.25 *Row reduce the following matrix to obtain the row-echelon form. Then continue to obtain the reduced row-echelon form.*

$$\begin{bmatrix} 3 & 5 & -4 & 2 \\ 1 & 2 & -1 & 1 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$

Exercise 1.2.26 *Row reduce the following matrix to obtain the row-echelon form. Then continue to obtain the reduced row-echelon form.*

$$\begin{bmatrix} -2 & 3 & -8 & 7 \\ 1 & -2 & 5 & -5 \\ 1 & -3 & 7 & -8 \end{bmatrix}$$

Exercise 1.2.27 *Find the solution of the system whose augmented matrix is*

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & 2 \\ 1 & 3 & 4 & 2 \\ 1 & 0 & 2 & 1 \end{array}\right]$$

Exercise 1.2.28 *Find the solution of the system whose augmented matrix is*

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & 2 \\ 2 & 0 & 1 & 1 \\ 3 & 2 & 1 & 3 \end{array}\right]$$

Exercise 1.2.30 *Find the solution of the system whose augmented matrix is*

$$\left[\begin{array}{ccccc|c} 1 & 0 & 2 & 1 & 1 & 2 \\ 0 & 1 & 0 & 1 & 2 & 1 \\ 1 & 2 & 0 & 0 & 1 & 3 \\ 1 & 0 & 1 & 0 & 2 & 2 \end{array}\right]$$

Exercise 1.2.31 *Find the solution of the system whose augmented matrix is*

$$\left[\begin{array}{ccccc|c} 1 & 0 & 2 & 1 & 1 & 2 \\ 0 & 1 & 0 & 1 & 2 & 1 \\ 0 & 2 & 0 & 0 & 1 & 3 \\ 1 & -1 & 2 & 2 & 2 & 0 \end{array}\right]$$

Exercise 1.2.32 *Find the solution to the system of equations,* $7x+14y+15z=22$, $2x+4y+3z=5$, *and* $3x+6y+10z=13$.

Exercise 1.2.33 *Find the solution to the system of equations,* $3x-y+4z=6$, $y+8z=0$, *and* $-2x+y=-4$.

Exercise 1.2.34 *Find the solution to the system of equations,* $9x-2y+4z=-17$, $13x-3y+6z=-25$, *and* $-2x-z=3$.

Exercise 1.2.35 *Find the solution to the system of equations,* $65x+84y+16z=546$, $81x+105y+20z=682$, *and* $84x+110y+21z=713$.

Exercise 1.2.36 *Find the solution to the system of equations,* $8x+2y+3z=-3, 8x+3y+3z=-1$, *and* $4x+y+3z=-9$.

Exercise 1.2.37 *Find the solution to the system of equations,* $-8x+2y+5z=18, -8x+3y+5z=13$, *and* $-4x+y+5z=19$.

Exercise 1.2.38 *Find the solution to the system of equations,* $3x-y-2z=3$, $y-4z=0$, *and* $-2x+y=-2$.

Exercise 1.2.39 *Find the solution to the system of equations,* $-9x+15y=66, -11x+18y=79$, $-x+y=4$, *and* $z=3$.

Exercise 1.2.46 *Find the rank of the following matrix.*

$$\begin{bmatrix} 4 & -16 & -1 & -5 \\ 1 & -4 & 0 & -1 \\ 1 & -4 & -1 & -2 \end{bmatrix}$$

Exercise 1.2.47 *Find the rank of the following matrix.*

$$\begin{bmatrix} 3 & 6 & 5 & 12 \\ 1 & 2 & 2 & 5 \\ 1 & 2 & 1 & 2 \end{bmatrix}$$

Exercise 1.2.48 *Find the rank of the following matrix.*

$$\begin{bmatrix} 0 & 0 & -1 & 0 & 3 \\ 1 & 4 & 1 & 0 & -8 \\ 1 & 4 & 0 & 1 & 2 \\ -1 & -4 & 0 & -1 & -2 \end{bmatrix}$$

Exercise 1.2.49 *Find the rank of the following matrix.*

$$\begin{bmatrix} 4 & -4 & 3 & -9 \\ 1 & -1 & 1 & -2 \\ 1 & -1 & 0 & -3 \end{bmatrix}$$

Exercise 1.2.50 *Find the rank of the following matrix.*

$$\begin{bmatrix} 2 & 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 7 \\ 1 & 0 & 0 & 1 & 7 \end{bmatrix}$$

Exercise 1.2.51 *Find the rank of the following matrix.*

$$\begin{bmatrix} 4 & 15 & 29 \\ 1 & 4 & 8 \\ 1 & 3 & 5 \\ 3 & 9 & 15 \end{bmatrix}$$