121 §6.1 #s 35, 39, 43, 49, 52, 59, 67, 69

→ Setup only

#s 35 – 48 Solve each system using Gaussian Elimination. Dependent, independent or inconsistent?

(35) $x + y = 5$
$-2x + y = -1$

$$\left[\begin{array}{cc|c} 1 & 1 & 5 \\ -2 & 1 & -1 \end{array}\right]$$

$$\xrightarrow{2R1+R2} \left[\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & 3 & 9 \end{array}\right] \xrightarrow{\frac{1}{3}R2} \left[\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & 1 & 3 \end{array}\right]$$

$$\xrightarrow{-R2+R1} \left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & 3 \end{array}\right]$$

$\{(2,3)\}$ INDEPENDENT

(39) $2x - y = 3$
$3x + 2y = 15$

$$\xrightarrow{-R1+R2} \left[\begin{array}{cc|c} 1 & 3 & 12 \\ 3 & 2 & 15 \end{array}\right] \xrightarrow{-3R1+R2} \left[\begin{array}{cc|c} 1 & 3 & 12 \\ 0 & -7 & -21 \end{array}\right]$$

$$\xrightarrow{-\frac{1}{7}R2} \left[\begin{array}{cc|c} 1 & 3 & 12 \\ 0 & 1 & 3 \end{array}\right] \xrightarrow{-3R2+R1} \left[\begin{array}{cc|c} 1 & 0 & 3 \\ 0 & 1 & 3 \end{array}\right]$$

$\{(3,3)\}$ INDEPENDENT

121 § 6.1 #s 43, 52, 59, 67, 69

(43) $3a - 5b = 7$

$-3a + 5b = 4$

$$\left[\begin{array}{cc|c} 3 & -5 & 7 \\ -3 & 5 & 4 \end{array}\right] \xrightarrow{R1+R2} \left[\begin{array}{cc|c} 3 & -5 & 7 \\ 0 & 0 & 11 \end{array}\right] \quad 0 = 11 \; !?$$

No Sol'n  Inconsistent.

(52) $3x = 4 + y$

$x + y = z - 1$

$2z = 3 - x$

$3x - y = 4$

$x + y - z = -1$

$x + 2z = 3$

$$\left[\begin{array}{ccc|c} 3 & -1 & 0 & 4 \\ 1 & 1 & -1 & -1 \\ 1 & 0 & 2 & 3 \end{array}\right] \xrightarrow{R1 \leftrightarrow R3} \left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 1 & 1 & -1 & -1 \\ 3 & -1 & 0 & 4 \end{array}\right]$$

$$\xrightarrow[-3R1+R3]{-R1+R2} \left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 1 & -3 & -4 \\ 0 & -1 & -6 & -5 \end{array}\right] \xrightarrow{R2+R3} \left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 1 & -3 & -4 \\ 0 & 0 & -9 & -9 \end{array}\right]$$

$$\xrightarrow{-\frac{1}{9}R3} \left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 1 & -3 & -4 \\ 0 & 0 & 1 & 1 \end{array}\right] \xrightarrow[3R3+R2]{-2R3+R1} \left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 1 \end{array}\right]$$

$(x, y, z) \in \{(1, -1, 1)\}$ Independent.

121 §6.1 #s 59, 67, 69

(59)

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

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & 2 \\ 2 & 1 & -1 & 1 \\ 2 & -2 & 2 & 5 \end{array}\right]$$

$$\begin{array}{l} \\ -2R1+R2 \\ -2R1+R3 \end{array} \left[\begin{array}{ccc|c} 1 & -1 & 1 & 2 \\ 0 & 3 & -3 & -3 \\ 0 & 0 & 0 & 1 \end{array}\right]$$

$0 = 1$ !?

⇒ No Solution !

$\boxed{\emptyset, \text{Inconsistent}}$

(67) Mike works 60 hrs per week.

$8/hr @ Burgers

$9/hr @ Soap

Total pay is $502

How many hours @ each job?

$x$ = # hrs he works @ Burgers

$y$ = # hrs " " " Soap

Then $x + y = 60$

& $8x + 9y = 502$ ⟶ $\left[\begin{array}{cc|c} 1 & 1 & 60 \\ 8 & 9 & 502 \end{array}\right]$

121 §6.1 #69

(69) She invested $40,000

Some in Mut. Fund. @ 8%

" " T-Bills @ 9%

" " Mun. Bonds @ 12%

Total return was $3660.

Total invested in T-Bills & Munic. Bonds equals her investment in Mutual Fund.

Let x = amt invested @ 8% ($1000's) MF

y = " " " 9% ($1000s) TB

z = " " " 12% ($1000s) MB

Then
$$\begin{cases} x + y + z = 40 \\ .08x + .09y + .12z = 3.66 \end{cases}$$

$$y + z = x$$

$$\Rightarrow \boxed{x - y - z = 0}$$

$$\begin{bmatrix} 1 & 1 & 1 & 40 \\ .08 & .09 & .12 & 3.66 \\ 1 & -1 & -1 & 0 \end{bmatrix}$$