392: 4, 6, 8-10, 42-47

4. $-4x+y=19$, $3x-2y=-18$

$$\begin{bmatrix}-4 & 1\\ 3 & -2\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}19\\ -18\end{bmatrix}$$

$A \cdot X = B$ $\quad X = A^{-1}B$

$X = A^{-1}B$

$$A^{-1}=\begin{bmatrix}-.4 & -.2\\ -.6 & -.8\end{bmatrix} \quad A^{-1}B=\begin{bmatrix}-4\\ 3\end{bmatrix}$$

$(-4, 3)$

6. $3x-2y+8z=38$, $6x+3y-9z=-12$, $4x+4y+20z=0$

$$\begin{bmatrix}3 & -2 & 8\\ 6 & 3 & -9\\ 4 & 4 & 20\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}38\\ -12\\ 0\end{bmatrix}$$

$A \cdot X = B$

$X = A^{-1}B$

$$A^{-1}=\begin{bmatrix}4/29 & 3/29 & -1/116\\ -13/58 & 7/174 & 25/232\\ 1/58 & -5/174 & 7/232\end{bmatrix} \quad A^{-1}B=\begin{bmatrix}4\\ -9\\ 1\end{bmatrix}$$

8. $4x+6y+z=-1$, $-x-y+8z=8$, $6x-4y+11z=21$

$$\begin{bmatrix}4 & 6 & 1\\ -1 & -1 & 8\\ 6 & -4 & 11\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}-1\\ 8\\ 21\end{bmatrix}$$

$A \cdot X = B$

$X = A^{-1}B$

$$A^{-1}=\begin{bmatrix}3/64 & -5/32 & 7/64\\ 59/448 & 19/224 & -33/448\\ 5/224 & 13/112 & 1/224\end{bmatrix} \quad A^{-1}B=\begin{bmatrix}1\\ -1\\ 1\end{bmatrix}$$

9. $s+t+m=9$, $.3s+.6t+1.2m=5.4$, $s+0t-m=+2$, $m+2=s$, $s-m=+2$

$$\begin{bmatrix}1 & 1 & 1\\ .3 & .6 & 1.2\\ 1 & 0 & -1\end{bmatrix}\begin{bmatrix}s\\ m\\ t\end{bmatrix}=\begin{bmatrix}9\\ 5.4\\ +2\end{bmatrix}$$

$A \cdot X = B$

$X = A^{-1}B$

$$A^{-1}=\begin{bmatrix}-2 & 10/3 & +2\\ 5 & -20/3 & -3\\ -2 & 10/3 & +1\end{bmatrix} \quad A^{-1}B=\begin{bmatrix}4\\ 3\\ 2\end{bmatrix}$$

Marcela downloaded 4 sitcoms, 3 talkshows and 2 movies.

10 $x + y + z = 37$
$x + 2y + 3z = 70$
$2x - y - z = 2$

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 2 & -1 & -1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 37 \\ 70 \\ 2 \end{bmatrix}$$

$A \cdot X = B$

$X = A^{-1}B$

$y + z = 2x - 2$
$2x - y - z = 2$

$$A^{-1} = \begin{bmatrix} 1/3 & 0 & 1/3 \\ 7/3 & -1 & -2/3 \\ -5/3 & 1 & 1/3 \end{bmatrix}$$

$$A^{-1}B = \begin{bmatrix} 13 \\ 15 \\ 9 \end{bmatrix}$$

He made 13 free throws, 15 goals and 9 3-pt shots

42. $AX = BX - C$
$AX - BX = -C$
$(A-B)X = -C$
$X = (A-B)^{-1}(-C)$

$(n \times n) \times n \times 1 \neq X(A-B)$
$n \times 1 \quad n \times n$
not possible

43 $D = AX + BX$
$D = (A+B)X$
$(A+B)^{-1}D = X$

$n \times 1 = (n \times n)(n \times 1)$
$n \times n \quad n \times 1$

44. $AX + BX = 2C - X$
$AX + BX + IX = 2C$
$(A + B + I)X = 2C$

$n \times n \quad n \times 1 \quad n \times 1$

$X = (A+B+I)^{-1}2C$

45. $X + C = AX - D$
$X - AX = -C - D$
$(I-A)X = -C - D$

$n \times 1 \quad n \times 1 \quad n \times 1 \quad n \times 1$
$n \times n \; n \times 1$
$X = (I-A)^{-1}(-C-D)$

46. $3X - D = C - BX$
$3X - BX = C + D$
$(3I - B)X = C + D$

$X = (3I-B)^{-1}(C+D)$

47. $BX = AD + AX$
$BX - AX = AD$
$(B-A)X = AD$

$n \times n \; n \times 1 = n \times n \; n \times 1$

$X = (B-A)^{-1}AD$