Homework Answers pg 683 - 684:

17. (5, 4)
24. (-2, 3)
25. (1,-1)
27. $\left(\frac{1}{2}, \frac{3}{4}\right)$
32. (3,-1) consistent and independent
34. no solution, inconsistent and independent
36. (3, 1) consistent and independent
39. (10, 8) consistent and independent

Extra Question: (-1, 2, 4)

Mar 8-9:31 AM

25) $2x-3y=5$ $5x+4y=1$

$\frac{2x}{2} = \frac{3y}{2} + \frac{5}{2}$

$x = \frac{3}{2}y + \frac{5}{2}$

$5\left(\frac{3}{2}y+\frac{5}{2}\right)+4y=1$

$\frac{15}{2}y+\frac{25}{2}+\frac{8}{2}y=1$

$\frac{23}{2}y = \frac{2}{2} - \frac{25}{2}$

$\frac{2}{23}\left(\frac{23}{2}y\right) = \left(\frac{-23}{2}\right)\frac{2}{23}$

$y=-1$

$2x-3y=5$

$2x-3(-1)=5$

$2x+3=5$

$2x=2$

$x=1$

$(1,-1)$

Mar 13-7:42 AM

27) $x+2y=2 \rightarrow x=2-2y$

$4x+4y=5$

$4(2-2y)+4y=5$

$8-8y+4y=5$

$8-4y=5$

$-4y=-3$

$y=\frac{3}{4}$

$4x+4(\frac{3}{4})=5$

$4x+3=5$

$4x=2$

$\frac{4x}{4}=\frac{2}{4}$

$x=\frac{1}{2}$

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39) $(\frac{1}{5}x+\frac{1}{2}y=6)10$

$(\frac{3}{5}x-\frac{1}{2}y=2)10$

$2x+5y=60$

$6x-5y=20$

$8x=80$

$x=10$

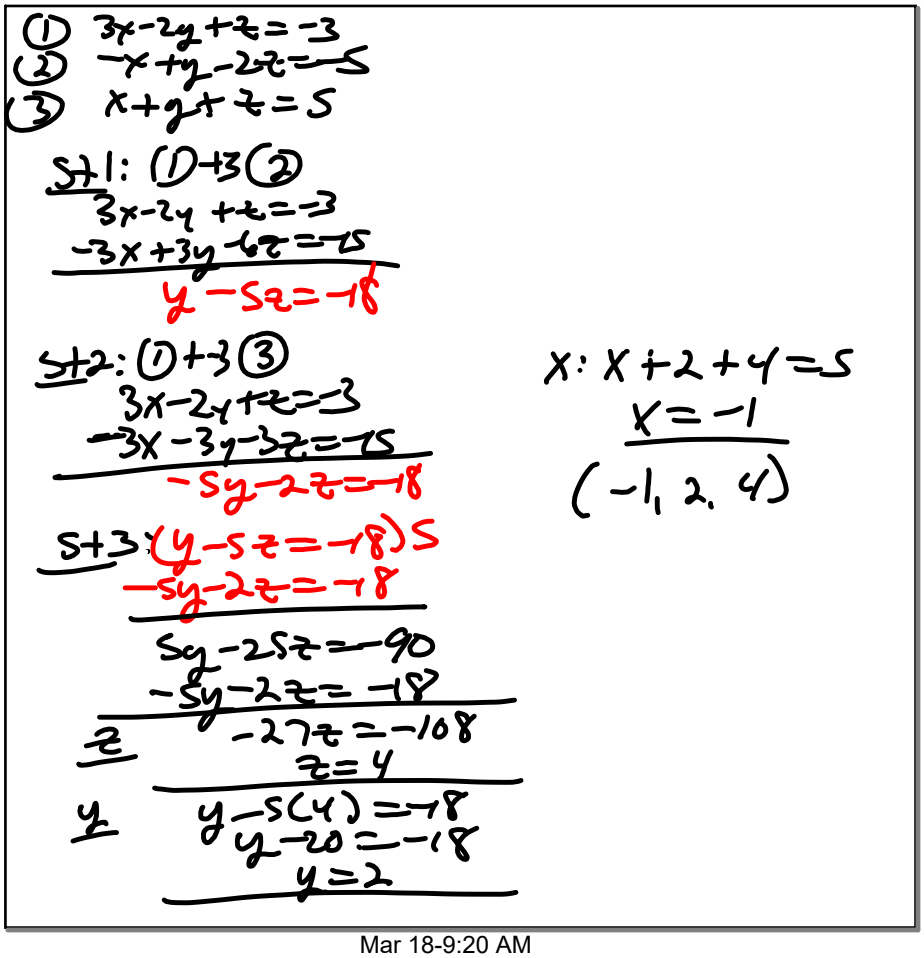
$\frac{1}{5}(10)+\frac{1}{2}(y)=6$

$2+\frac{1}{2}y=6$

$2(\frac{1}{2}y)=(4)2$

$y=8$

Mar 13-7:47 AM



Mar 18-9:20 AM

What are they used for?

Any data that is organized in columns and rows can be represented as a matrix. Matrices are used to represent real-world data such as the habits, or traits, of a population of people.

Matrix: An array of numbers named by the order or dimensions which is the number of rows by the number of columns. → elements

r x c

2 x 3 Matrix: $\begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix}$

3 x 2 Matrix: $\begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix}$

or $\begin{pmatrix} 2 & 1 \\ 3 & 6 \\ 4 & 1 \end{pmatrix}$

1 x 4 Matrix: $\begin{bmatrix} a & b & c & d \end{bmatrix}$

4 x 1 Matrix: $\begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix}$

[ ] brackets

or ( ) parenthesis

Square Matrix: Same number of rows and columns.

2x2, 3x3

Matrices are congruent if they have the same dimensions and are identical.

Find x and y.

1. $\begin{bmatrix} y-3 \\ y \end{bmatrix} = \begin{bmatrix} x \\ 2x \end{bmatrix}$ (2x1 = 2x1)

$y - 3 = x$

$y = 2x$

Subst. $2x - 3 = x$ | $y = 2(3)$

$x = 3$ | $y = 6$

$\therefore (3, 6)$

2. $\begin{bmatrix} y+4 & 3 \\ y & -1 \end{bmatrix} = \begin{bmatrix} x-1 & 3 \\ 3x & -1 \end{bmatrix}$ (2x2 = 2x2)

$y + 4 = x - 1$

$y = 3x$

$3x + 4 = x - 1$ | $y = 3(-5/2)$

$2x = -5$ | $y = -15/2$

$x = -5/2$

$\therefore \left(\frac{-5}{2}, \frac{-15}{2}\right)$

Matrices with the same order or dimensions can be added or subtracted: add/subtract the elements in the same position together.

Find A + B, A - B, and D - C:

$A = \begin{bmatrix} 1 & -3 \\ 4 & 6 \end{bmatrix}$ $B = \begin{bmatrix} -5 & 3 \\ 2 & 1 \end{bmatrix}$ $C = \begin{bmatrix} -2 & -9 & 0 \\ 1 & 3 & 1 \\ -1/2 & 2 & 1/3 \end{bmatrix}$ $D = \begin{bmatrix} -3 & 0 & 2 \\ 1/2 & 1 & 4 \\ -1 & 3 & 0 \end{bmatrix}$

$A+B = \begin{bmatrix} 1-5 & -3+3 \\ 4+2 & 6+1 \end{bmatrix}$ $A-B = \begin{bmatrix} 1+5 & -3-3 \\ 4-2 & 6-1 \end{bmatrix}$ $D-C = \begin{bmatrix} -3+2 & 0+9 & 2-0 \\ \frac{1}{2}-1 & 1-3 & 4-1 \\ -1+1\frac{1}{2} & 3-2 & 0-\frac{1}{3} \end{bmatrix}$

$A+B = \begin{bmatrix} -4 & 0 \\ 6 & 7 \end{bmatrix}$ $A-B = \begin{bmatrix} 6 & -6 \\ 2 & 5 \end{bmatrix}$ $D-C = \begin{bmatrix} -1 & 9 & 2 \\ -1\frac{1}{2} & -2 & 3 \\ -1\frac{1}{2} & 1 & -\frac{1}{3} \end{bmatrix}$

Multiplication of Matrices:

Scalar Multiplication: $2\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 2a & 2b \\ 2c & 2d \end{bmatrix}$ Multiply: $3\begin{bmatrix} -2 & -1 \\ 0 & 5 \end{bmatrix} = \begin{bmatrix} -6 & -3 \\ 0 & 15 \end{bmatrix}$

Matrix Multiplication: $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \bullet \begin{bmatrix} x & w \\ y & z \end{bmatrix} = \begin{bmatrix} ax+by & aw+bz \\ cx+dy & cw+dz \end{bmatrix}$

row x column

Matrices A & b can be multiplied only if the number of columns in A equals the number of rows in B.

Algebraically: The product of an m x n matrix and an n x p matrix is an m x p matrix.

Numerically: The product of a 2 x 3 matrix and a 3 x 4 matrix is a 2 x 4 matrix.

$(m \times n)(n \times p) = m \times p$

2x3 m x 3x4 m

$= 2 \times 4$

$2 \times 3 \bullet 3 \times 4 = 2 \times 4$

Given:

$A = \begin{bmatrix} -1 & 0 \\ 2 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 4 \\ -1 & -2 \end{bmatrix}$ $C = \begin{bmatrix} -2 & 1 & 0 \end{bmatrix}$ $D = \begin{bmatrix} 5 \\ -2 \\ -1 \end{bmatrix}$

$E = \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$ $F = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ -1 & -2 \end{bmatrix}$ $G = \begin{bmatrix} 0 & 1 \\ 1 & -2 \end{bmatrix}$

Find:

1. AB
2. BA $\neq [\ ]$ matrix multiplication is not commutative.

$A = \begin{bmatrix} -1 & 0 \\ 2 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 4 \\ -1 & -2 \end{bmatrix}$ $= \begin{bmatrix} -1(1)+0(-1) & -1(4)+0(-2) \\ 2(1)+3(-1) & 2(4)+3(-2) \end{bmatrix}$

$2 \times 2 \bullet 2 \times 2 = 2 \times 2$

$= \begin{bmatrix} -1 & -4 \\ -1 & 2 \end{bmatrix}$

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$$B=\begin{bmatrix}1 & 4\\ -1 & -2\end{bmatrix} \quad A=\begin{bmatrix}-1 & 0\\ 2 & 3\end{bmatrix}=\begin{bmatrix}1(-1)+4(2) & 1(0)+4(3)\\ -1(-1)+-2(2) & -1(0)+-2(3)\end{bmatrix}$$

$$=\begin{bmatrix}7 & 12\\ -3 & -6\end{bmatrix}$$

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Given:

$$A=\begin{bmatrix}-1 & 0\\ 2 & 3\end{bmatrix} \quad B=\begin{bmatrix}1 & 4\\ -1 & -2\end{bmatrix} \quad C=\begin{bmatrix}-2 & 1 & 0\end{bmatrix} \quad D=\begin{bmatrix}5\\ -2\\ -1\end{bmatrix}$$

$$E=\begin{bmatrix}-2 & 4 & 5\\ 1 & 0 & 6\end{bmatrix} \quad F=\begin{bmatrix}1 & 2\\ 0 & 2\\ -1 & -2\end{bmatrix} \quad G=\begin{bmatrix}0 & 1\\ 1 & -2\end{bmatrix}$$

3. CD
4. EFG
5. 2FE

$C = \begin{bmatrix} -2 & 1 & 0 \end{bmatrix}$ $D = \begin{bmatrix} 5 \\ -2 \\ -1 \end{bmatrix}$

1×3 $3 \times 1 = 1 \times 1$

$= \begin{bmatrix} -2(5)+1(-2)+0(-1) \end{bmatrix} = \begin{bmatrix} -10-2+0 \end{bmatrix}$

$= \begin{bmatrix} -12 \end{bmatrix}$

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$E = \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$ $F = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ -1 & -2 \end{bmatrix}$ $G = \begin{bmatrix} 0 & 1 \\ 1 & -2 \end{bmatrix}$ (EFG

2×3 3×2

$EF = 2 \times 2$

$EF = \begin{bmatrix} -2(1)+4(0)+5(-1) & -2(2)+4(2)+5(-2) \\ 1(1)+0(0)+6(-1) & 1(2)+0(2)+6(-2) \end{bmatrix} = \begin{bmatrix} -7 & -6 \\ -5 & -10 \end{bmatrix}$

$(EF)G = \begin{bmatrix} -7 & -6 \\ -5 & -10 \end{bmatrix} \cdot \begin{bmatrix} 0 & 1 \\ 1 & -2 \end{bmatrix} = \begin{bmatrix} -7(0)+-6(1) & -7(1)+-6(-2) \\ -5(0)+-10(1) & -5(1)+-10(-2) \end{bmatrix} = \begin{bmatrix} -6 & 5 \\ -10 & 15 \end{bmatrix}$

$2 \times 2 \cdot 2 \times 2$

$= 2 \times 2$

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$E = \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$ $F = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ -1 & -2 \end{bmatrix}$ $G = \begin{bmatrix} 0 & 1 \\ 1 & -2 \end{bmatrix}$

$EF = 2\times3 \times 3\times2 = 2\times2$

$(EF)G = 2\times2 \times 2\times2 = 2\times2$

$EF = \begin{bmatrix} -2(1)+4(0)+5(-1) & -2(2)+4(2)+5(-2) \\ 1(1)+0(0)+6(-1) & 1(2)+0(2)+6(-2) \end{bmatrix}$

$EF = \begin{bmatrix} -7 & -6 \\ -5 & -10 \end{bmatrix}$ $G = \begin{bmatrix} 0 & 1 \\ 1 & -2 \end{bmatrix}$

$(EF)G = \begin{bmatrix} -7(0)+-6(1) & -7(1)+-6(-2) \\ -5(0)+-10(1) & -5(1)+-10(-2) \end{bmatrix} = \begin{bmatrix} -6 & 5 \\ -10 & 15 \end{bmatrix}$

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2 $F = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ -1 & -2 \end{bmatrix}$ $E = \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$

$3\times2 \cdot 2\times3 = 3\times3$

$\begin{bmatrix} \_ & \_ & \_ \\ \_ & \_ & \_ \\ \_ & \_ & \_ \end{bmatrix}$

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2 $F = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ -1 & -2 \end{bmatrix}$ $E = \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$

$3\times2 \quad \times \quad 2\times3 = 3\times3$

$2F = \begin{bmatrix} 2 & 4 \\ 0 & 4 \\ -2 & -4 \end{bmatrix}$ $E = \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 6 \end{bmatrix}$

$= \begin{bmatrix} 2(-2)+4(1) & 2(4)+4(0) & 2(5)+4(6) \\ 0(-2)+4(1) & 0(4)+4(0) & 0(5)+4(6) \\ -2(-2)+-4(1) & -2(4)+-4(0) & -2(5)+-4(6) \end{bmatrix}$

$= \begin{bmatrix} 0 & 8 & 34 \\ 4 & 0 & 24 \\ 0 & -8 & -34 \end{bmatrix}$

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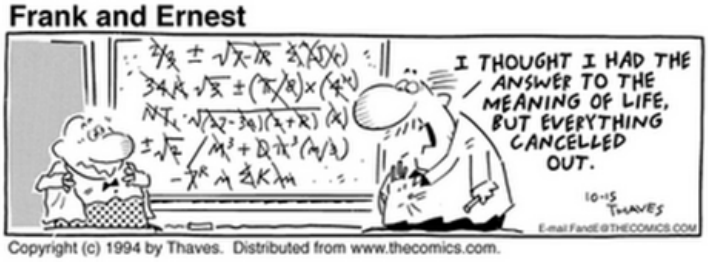
Homework:

P. 716

2, 4, 6, 14, 22, 24



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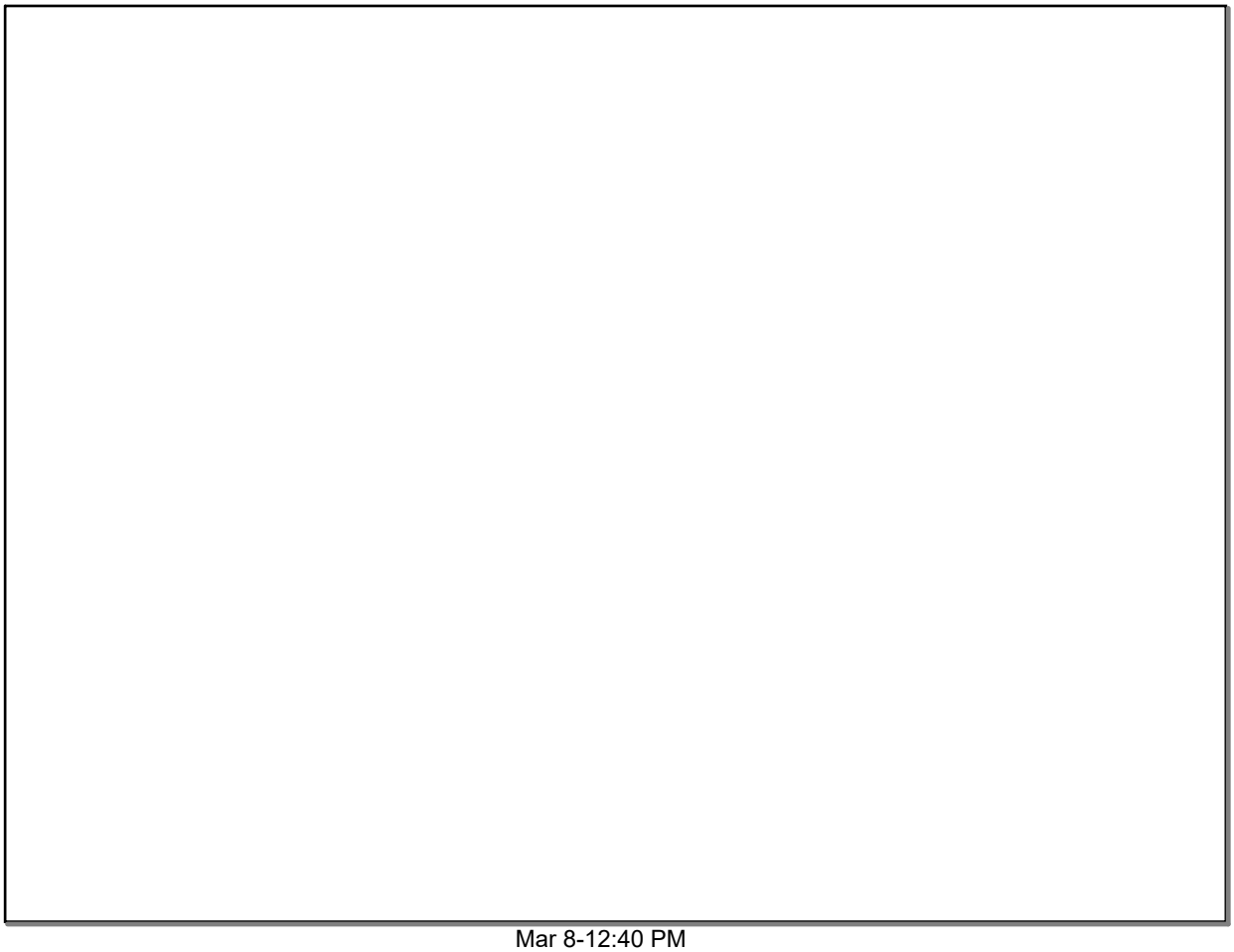

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