

HW Practice Worksheet Unit 2: Intro to Matrices

12. A has 2 rows and 4 columns: 2×4

14. C has 3 rows and 1 column: 3×1

16. entry b_{12} is the entry in row 1, column 2: -5

13. B has 4 rows and 3 columns: 4×3

15. entry a_{23} is the entry in row 2, column 3: 8

17. entry c_{31} is the entry in row 3, column 1: 6

$$19. -4C = \begin{bmatrix} -4(7) \\ -4(2) \\ -4(6) \end{bmatrix} = \begin{bmatrix} -28 \\ -8 \\ -24 \end{bmatrix}$$

$$25. \begin{bmatrix} -6 & 5 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} y+12 & 5 \\ -1 & x+7 \end{bmatrix}$$

$$\begin{aligned} -6 &= y+12 & 0 &= x+7 \\ y &= -18 & x &= -7 \\ x &= -7 \text{ and } y &= -18 \end{aligned}$$

$$30. A + B = \begin{bmatrix} 7+6 & 3+0 & -1+11 & 5+(-3) \\ -2+(-5) & 8+2 & 0+(-8) & -4+9 \end{bmatrix} = \begin{bmatrix} 13 & 3 & 10 & 2 \\ -7 & 10 & -8 & 5 \end{bmatrix}$$

$$27. \begin{bmatrix} \frac{2}{3}x & 12 \\ -4 & \frac{1}{2}y+5 \end{bmatrix} = \begin{bmatrix} 6 & x+3 \\ -4 & y+1 \end{bmatrix}$$

$$33. -3B = \begin{bmatrix} -3(6) & -3(0) & -3(11) & -3(-3) \\ -3(-5) & -3(2) & -3(-8) & -3(9) \end{bmatrix} = \begin{bmatrix} -18 & 0 & -33 & 9 \\ 15 & -6 & 24 & -27 \end{bmatrix}$$

$$\begin{aligned} \frac{2}{3}x &= 6 & \frac{1}{2}y+5 &= y+1 \\ x &= 9 & y+10 &= 2y+2 \\ 12 &= x+3 & 8 &= y \\ x &= 9 & & \\ x &= 9 \text{ and } y &= 8 \end{aligned}$$

$$35. A + B - A = B = \begin{bmatrix} 6 & 0 & 11 & -3 \\ -5 & 2 & -8 & 9 \end{bmatrix}$$

$$29. \begin{bmatrix} 4.1x & x \\ -100 & -3.7y \end{bmatrix} = \begin{bmatrix} 16.4 & x \\ -25x & -11.1 \end{bmatrix}$$

$$4.1x = 16.4 \quad -3.7y = -11.1$$

$$\begin{aligned} 36. 4(B-A) &= 4 \begin{bmatrix} -1 & -3 & 12 & -8 \\ -3 & -6 & -8 & 13 \end{bmatrix} \\ &= \begin{bmatrix} 4(-1) & 4(-3) & 4(12) & 4(-8) \\ 4(-3) & 4(-6) & 4(-8) & 4(13) \end{bmatrix} \\ &= \begin{bmatrix} -4 & -12 & 48 & -32 \\ -12 & -24 & -32 & 52 \end{bmatrix} \end{aligned}$$

$$39. 2A - (-B - A) = 2A + B + A = 3A + B$$

$$\begin{aligned} &= \begin{bmatrix} 3(7) & 3(3) & 3(-1) & 3(5) \\ 3(-2) & 3(8) & 3(0) & 3(-4) \end{bmatrix} + \begin{bmatrix} 6 & 0 & 11 & -3 \\ -5 & 2 & -8 & 9 \end{bmatrix} \\ &= \begin{bmatrix} 21+6 & 9+0 & -3+11 & 15+(-3) \\ -6+(-5) & 24+2 & 0+(-8) & -12+9 \end{bmatrix} \\ &= \begin{bmatrix} 27 & 9 & 8 & 12 \\ -11 & 26 & -8 & -3 \end{bmatrix} \end{aligned}$$

$$42. -\frac{1}{2}A + (B - A) = B - \frac{3}{2}A$$

$$\begin{aligned} &= \begin{bmatrix} 6 & 0 & 11 & -3 \\ -5 & 2 & -8 & 9 \end{bmatrix} - \begin{bmatrix} \frac{3}{2}(7) & \frac{3}{2}(3) & \frac{3}{2}(-1) & \frac{3}{2}(5) \\ \frac{3}{2}(-2) & \frac{3}{2}(8) & \frac{3}{2}(0) & \frac{3}{2}(-4) \end{bmatrix} \\ &= \begin{bmatrix} 6 - \frac{21}{2} & 0 - \frac{9}{2} & 11 - \left(-\frac{3}{2}\right) & -3 - \frac{15}{2} \\ -5 - (-3) & 2 - 12 & -8 - 0 & 9 - (-6) \end{bmatrix} \\ &= \begin{bmatrix} -\frac{9}{2} & -\frac{9}{2} & \frac{25}{2} & -\frac{21}{2} \\ -2 & -10 & -8 & 15 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} 43. 3B + 2A &= \begin{bmatrix} 18 & 0 & 33 & -9 \\ -15 & 6 & -24 & 27 \end{bmatrix} + \begin{bmatrix} 14 & 6 & -2 & 10 \\ -4 & 16 & 0 & -8 \end{bmatrix} \\ &= \begin{bmatrix} 18+14 & 0+6 & 33+(-2) & -9+10 \\ -15+(-4) & 6+16 & -24+0 & 27+(-8) \end{bmatrix} \\ &= \begin{bmatrix} 32 & 6 & 31 & 1 \\ -19 & 22 & -24 & 19 \end{bmatrix} \end{aligned}$$

$$45. 4\left(\frac{1}{2}A + \frac{2}{3}A\right) = 4\left(\frac{3}{6}A + \frac{4}{6}A\right) = 4\left(\frac{7}{6}A\right) = \frac{14}{3}A$$

$$= \begin{bmatrix} \frac{14}{3}(7) & \frac{14}{3}(3) & \frac{14}{3}(-1) & \frac{14}{3}(5) \\ \frac{14}{3}(-2) & \frac{14}{3}(8) & \frac{14}{3}(0) & \frac{14}{3}(-4) \end{bmatrix} = \begin{bmatrix} \frac{98}{3} & 14 & -\frac{14}{3} & \frac{70}{3} \\ -\frac{28}{3} & \frac{112}{3} & 0 & -\frac{56}{3} \end{bmatrix}$$

$$46. a_{ij} = i^2 + 2j - 3$$

$$a_{11} = 1^2 + 2(1) - 3 = 1 + 2 - 3 = 0$$

$$a_{12} = 1^2 + 2(2) - 3 = 1 + 4 - 3 = 2$$

$$a_{13} = 1^2 + 2(3) - 3 = 1 + 6 - 3 = 4$$

$$a_{21} = 2^2 + 2(1) - 3 = 4 + 2 - 3 = 3$$

$$a_{22} = 2^2 + 2(2) - 3 = 4 + 4 - 3 = 5$$

$$a_{23} = 2^2 + 2(3) - 3 = 4 + 6 - 3 = 7$$

$$a_{31} = 3^2 + 2(1) - 3 = 9 + 2 - 3 = 8$$

$$a_{32} = 3^2 + 2(2) - 3 = 9 + 4 - 3 = 10$$

$$a_{33} = 3^2 + 2(3) - 3 = 9 + 6 - 3 = 12$$

$$\begin{bmatrix} 0 & 2 & 4 \\ 3 & 5 & 7 \\ 8 & 10 & 12 \end{bmatrix}$$

50. M has 4 rows and 4 columns: 4×4

52. $m_{21} = 5$; there are 5 maps from Asia in the '60s.

54. Add all entries in the '60s column: $3 + 5 + 2 + 8 = 18$

55.

	Squash	Tomatoes	Peppers	Melons
$P =$ Jane	27	31	24	18
José	48	72	61	25

56. The number of peppers sold by Jane is in p_{13} .

58. Yes; a 4×2 matrix could be created with the produce listed in the rows and the sellers listed in the columns.

60. Add the events in the Septemeber column:
 $1 + 4 + 2 = 7$

62. Find the column whose sum of events is the largest:

$$\text{Aug.} = 0 + 1 + 1 = 2$$

$$\text{Sept.} = 1 + 4 + 2 = 7$$

$$\text{Oct.} = 2 + 3 + 3 = 8$$

$$\text{Nov.} = 1 + 3 + 3 = 7$$

$$\text{Dec.} = 2 + 0 + 2 = 4$$

Most events occurred in October.

51. $m_{42} = 5$; there are 5 maps from Africa in the '70s.

53. Add all entries in row 4: $8 + 5 + 4 + 6 = 23$

57. p_{21} . It represents the number of squash José sold.

59. The matrix has 3 rows and 5 columns: 3×5 .

61. Add the events in the drama production row:
 $0 + 1 + 2 + 1 + 2 = 6$