1. Determine the sum $\begin{bmatrix} 3 & 0 & 0 & -1 \\ 8 & -2 & 0 & 0 \end{bmatrix} + \begin{bmatrix} 1 & 1 & 1 & 1 \\ -3 & -3 & -3 & -3 \end{bmatrix}$, if it exists.

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

B. $\begin{bmatrix} 4 & 1 & 1 & 0 \\ 11 & 1 & 3 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 6 & 6 \\ 14 & 14 \end{bmatrix}$

D. The sum does not exist.

2. Evaluate.

$\begin{bmatrix} 0 & 2 \\ 4 & -4 \end{bmatrix} - \begin{bmatrix} 1 & -6 \\ 4 & 1 \end{bmatrix}$

A) $\begin{bmatrix} 1 & 6 \\ 0 & -6 \end{bmatrix}$ B) $\begin{bmatrix} -1 & 8 \\ 0 & -5 \end{bmatrix}$

C) $\begin{bmatrix} -1 & -4 \\ 0 & -3 \end{bmatrix}$ D) $\begin{bmatrix} 1 & -4 \\ 8 & -3 \end{bmatrix}$

3. Ashok, Kiri, and Justin designed 3 computer games, x, y, and z. They have sold some games and want to expand their business by advertising on the Internet. This matrix gives their sales for the first month.

$\begin{matrix} x \\ y \\ z \end{matrix} \begin{bmatrix} 13 \\ 9 \\ 22 \end{bmatrix}$

Their goal is to double the number of games sold each month for the next 4 months. What matrix represents their goal?

A. $\begin{bmatrix} 26 \\ 18 \\ 44 \end{bmatrix}$ C. $\begin{bmatrix} 208 \\ 144 \\ 352 \end{bmatrix}$

B. $\begin{bmatrix} 104 \\ 72 \\ 176 \end{bmatrix}$ D. $\begin{bmatrix} 52 \\ 36 \\ 88 \end{bmatrix}$

4. What is AB ?

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

A. $\begin{bmatrix} 52 & 156 \\ 130 & 26 \end{bmatrix}$

C. $\begin{bmatrix} -6 & 6 \\ 30 & 0 \\ 8 & 12 \\ 45 & 7 \end{bmatrix}$

B. $\begin{bmatrix} -1 & -17 \\ 12 & 36 \\ 18 & 26 \\ 53 & 61 \end{bmatrix}$

D. $\begin{bmatrix} -42 & 14 \\ 84 & 0 \\ 56 & 28 \\ 126 & 98 \end{bmatrix}$

5. Four teams participate in a math competition. The number of 1st, 2nd, 3rd, and 4th place finishes in each round determines the final score. This matrix shows the results of all 10 rounds of this competition.

$$\begin{array}{c} \\ \text{Team 1} \\ \text{Team 2} \\ \text{Team 3} \\ \text{Team 4} \end{array} \begin{array}{cccc} 1^{st} & 2^{nd} & 3^{rd} & 4^{th} \\ \begin{bmatrix} 3 & 4 & 1 & 2 \\ 2 & 3 & 3 & 2 \\ 4 & 1 & 1 & 4 \\ 1 & 2 & 5 & 2 \end{bmatrix} \end{array}$$

Teams earn 4 points for each 1st place finish, 3 points for 2nd place finishes, 2 points for 3rd place finishes, and 1 point for 4th place finishes. Which teams tie for 2nd place?

A. 1 and 2

B. 2 and 3

C. 3 and 4

D. 4 and 1

6. Solve for x and y.

$$\begin{bmatrix} 4 & 1 & 3 \\ -2 & x & 1 \end{bmatrix} \begin{bmatrix} 9 & -2 \\ 2 & 1 \\ -1 & 1 \end{bmatrix} = \begin{bmatrix} y & -4 \\ -13 & 8 \end{bmatrix}$$

A. $x = -3, \ y = 13$

B. $x = 3, \ y = 35$

C. $x = 13, \ y = 3$

D. $x = 35, \ y = -13$

7. If A is a 3 × 2 matrix, B is a 3 × 3 matrix, and C is a 2 × 3 matrix, what are the dimensions of $A \times C \times B$?

A. 3 × 3

B. 2 × 2

C. 2 × 3

D. 18 × 18

8. A used bookstore sells paperback books for $1.00 each, hardback books for $3.00 each, and CDs for $4.00 each. On Saturday, they sold 37 paperbacks, 52 hardbacks, and 42 CDs. What matrix operation would compute the store's total income for that day?

A.

$$\begin{bmatrix} \$1.00 & \$3.00 & \$4.00 \end{bmatrix} \begin{bmatrix} 37 \\ 52 \\ 42 \end{bmatrix}$$

C.

$$\begin{bmatrix} 37 \\ 52 \\ 42 \end{bmatrix} \begin{bmatrix} \$1.00 & \$3.00 & \$4.00 \end{bmatrix}$$

B.

$$\begin{bmatrix} \$1.00 & \$3.00 & \$4.00 \end{bmatrix} \begin{bmatrix} 37 & 52 & 42 \end{bmatrix}$$

D.

$$\begin{bmatrix} 37 \\ 52 \\ 42 \end{bmatrix} \begin{bmatrix} \$1.00 \\ \$3.00 \\ \$4.00 \end{bmatrix}$$

9. Find the values of x and y for this matrix equation:

$$\begin{bmatrix} x & 5 & 7 \\ 2 & 8 & 4 \end{bmatrix} \cdot \begin{bmatrix} 1 & 3 \\ y & 2 \\ 5 & 6 \end{bmatrix} = \begin{bmatrix} 68 & 61 \\ 70 & 46 \end{bmatrix}$$

A. $x = 19$, $y = -2$

B. $x = 18$, $y = 2$

C. $x = 3$, $y = 6$

D. $x = -2$, $y = 5$

10. Carlos has investments in Funds A, B, and C. Each fund invests money in both stocks and bonds. The matrices show the dollar amounts invested in each fund and the annual yields. Use this information to determine how many dollars Fund B will earn in one year.

	Stocks	Bonds
A	$10,000	$10,000
B	$15,000	$ 5,000
C	$ 5,000	$25,000

Annual Yield

Stocks	.06
Bonds	.04

A. $ 1,100

B. $ 1,500

C. $ 2,000

D. $20,000

11. Given $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 0 & -3 \end{bmatrix}$, what is AB ?

A. $\begin{bmatrix} -3 \end{bmatrix}$

C. $\begin{bmatrix} 10 \end{bmatrix}$

B. $\begin{bmatrix} 6 \\ 0 \\ 9 \end{bmatrix}$

D. $\begin{bmatrix} 6 & 0 & -3 \\ 12 & 0 & -6 \\ 18 & 0 & -9 \end{bmatrix}$

12. Matrix *A* represents the amount of fruit, in pounds, Juanita purchased on 3 different trips to a store. Matrix *B* gives the price per pound of each type of fruit.

$$A = \begin{array}{c} \text{oranges} \quad \text{pears} \quad \text{grapes} \\ \begin{bmatrix} 6 & 7 & 2 \\ 12 & 5 & 1 \\ 18 & 0 & 3 \end{bmatrix} \end{array}$$

$$B = \begin{array}{c} \text{oranges} \\ \text{pears} \\ \text{grapes} \end{array} \begin{bmatrix} \$0.50 \\ \$2.00 \\ \$2.25 \end{bmatrix}$$

What matrix gives the amount Juanita spent on each trip?

A. $\begin{bmatrix} \$18.00 \\ \$24.00 \\ \$13.50 \end{bmatrix}$

C. $\begin{bmatrix} \$71.25 \\ \$85.50 \\ \$99.75 \end{bmatrix}$

B. $\begin{bmatrix} \$21.50 \\ \$18.25 \\ \$15.75 \end{bmatrix}$

D. $\begin{bmatrix} \$3.00 & \$3.50 & \$1.00 \\ \$24.00 & \$10.00 & \$2.00 \\ \$40.50 & \$0.00 & \$6.75 \end{bmatrix}$

13. Amanda is working on he math homework. One of her problems is to multiply matrices of the following order: 2x3 multiplied by 2x3. Since the matrices are the same dimensions, she believes they can be multiplied. Do you agree with Amanda? Explain why or why not.

14. Your friend John was sick on the day we learned about matrix multiplication and had to miss class. He is very confused on how these operations work. Explain to the John how to multiply matrices.

15. Come up with your own scenario in which you need matrix multiplication to come up with the solution. Then find the answer to your problem. (An example of this would be finding the profit of your bake sale)