1. (1 point) Let A and B be the following matrices.

$$A = \begin{bmatrix} 8 & 1 & -1 \\ -2 & -2 & -7 \\ -8 & -7 & 8 \end{bmatrix}, \qquad B = \begin{bmatrix} -3 & 3 & 0 \\ -1 & 0 & -2 \\ -7 & -9 & -8 \end{bmatrix}$$

Perform the following operations:

$$8A = \begin{bmatrix} \_ & \_ & \_ \\ \_ & \_ & \_ \\ \_ & \_ & \_ \end{bmatrix}$$

$$A + 10B = \begin{bmatrix} \_ & \_ & \_ \\ \_ & \_ & \_ \\ \_ & \_ & \_ \end{bmatrix}$$

$$-5A + 4B = \begin{bmatrix} \_ & \_ & \_ \\ \_ & \_ & \_ \\ \_ & \_ & \_ \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 64 & 8 & -8 \\ -16 & -16 & -56 \\ -64 & -56 & 64 \end{bmatrix}$$

- $$\begin{bmatrix} -22 & 31 & -1 \\ -12 & -2 & -27 \\ -78 & -97 & -72 \end{bmatrix}$$

- $$\begin{bmatrix} -52 & 7 & 5 \\ 6 & 10 & 27 \\ 12 & -1 & -72 \end{bmatrix}$$

2. (1 point) Let

$$A = \begin{bmatrix} 1 & 1 & -1 \\ -1 & 5 & -5 \\ 2 & -1 & -5 \end{bmatrix}.$$

Compute the following.

$$A + A^T = \begin{bmatrix} \_ & \_ & \_ \\ \_ & \_ & \_ \\ \_ & \_ & \_ \end{bmatrix}$$

$$A - A^T = \begin{bmatrix} \_ & \_ & \_ \\ \_ & \_ & \_ \\ \_ & \_ & \_ \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 2 & 0 & 1 \\ 0 & 10 & -6 \\ 1 & -6 & -10 \end{bmatrix}$$

- $$\begin{bmatrix} 0 & 2 & -3 \\ -2 & 0 & -4 \\ 3 & 4 & 0 \end{bmatrix}$$

3. (1 point) Compute the following products.

$$\begin{bmatrix} -7 & -1 \\ -5 & -1 \end{bmatrix} \begin{bmatrix} -4 \\ 2 \end{bmatrix} = \begin{bmatrix} \_\_\_ \\ \_\_ \end{bmatrix}$$

$$\begin{bmatrix} -7 & -1 \\ -5 & -1 \end{bmatrix} \begin{bmatrix} 1 \\ 5 \end{bmatrix} = \begin{bmatrix} \_\_\_ \\ \_\_ \end{bmatrix}$$

$$\begin{bmatrix} -7 & -1 \\ -5 & -1 \end{bmatrix} \begin{bmatrix} -4 & 1 \\ 2 & 5 \end{bmatrix} = \begin{bmatrix} \_\_\_ & \_\_ \\ \_\_\_ & \_\_ \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 26 \\ 18 \end{bmatrix}$$

- $$\begin{bmatrix} -12 \\ -10 \end{bmatrix}$$

- $$\begin{bmatrix} 26 & -12 \\ 18 & -10 \end{bmatrix}$$

4. (1 point) Compute the following product.

$$\begin{bmatrix} -4 & 7 \\ 9 & -9 \end{bmatrix} \begin{bmatrix} -2 & -1 & -3 \\ 8 & 4 & -5 \end{bmatrix} = \begin{bmatrix} \_\_\_ & \_\_ & \_\_ \\ \_\_\_ & \_\_ & \_\_ \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 64 & 32 & -23 \\ -90 & -45 & 18 \end{bmatrix}$$

5. (1 point) Compute the following product.

$$\begin{bmatrix} 5 & -3 & -1 \\ 9 & 9 & 5 \\ 4 & 3 & 4 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 0 \end{bmatrix} = \begin{bmatrix} \_\_\_ & \_\_ & \_\_ \\ \_\_\_ & \_\_ & \_\_ \\ \_\_\_ & \_\_ & \_\_ \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 5 & -12 & 0 \\ 9 & 36 & 0 \\ 4 & 12 & 0 \end{bmatrix}$$

6. (1 point) Compute the following product.

$$\begin{bmatrix} -8 & 0 & 0 \\ 3 & 6 & 0 \\ -6 & 7 & -5 \end{bmatrix} \begin{bmatrix} 9 & 0 & 0 \\ -5 & -2 & 0 \\ -6 & -4 & 1 \end{bmatrix} = \begin{bmatrix} \underline{\quad} & \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} -72 & 0 & 0 \\ -3 & -12 & 0 \\ -59 & 6 & -5 \end{bmatrix}$$

7. (1 point) Compute the following product.

$$\begin{bmatrix} 1 & -3 & 1 \\ -8 & -7 & -2 \\ 2 & 4 & 5 \end{bmatrix} \begin{bmatrix} 5 & -1 & 1 \\ 5 & 9 & -1 \\ -1 & -2 & -8 \end{bmatrix} = \begin{bmatrix} \underline{\quad} & \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} -11 & -30 & -4 \\ -73 & -51 & 15 \\ 25 & 24 & -42 \end{bmatrix}$$

8. (1 point) Let A and B be the following matrices.

$$A = \begin{bmatrix} 8 & 4 \\ -3 & 6 \end{bmatrix}, \qquad B = \begin{bmatrix} -5 & -9 \\ 2 & -7 \end{bmatrix}$$

Perform the following operations:

$$A \cdot B = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

$$B \cdot A = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} -32 & -100 \\ 27 & -15 \end{bmatrix}$$

- $$\begin{bmatrix} -13 & -74 \\ 37 & -34 \end{bmatrix}$$

9. (1 point) Let A and B be the following matrices.

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

Perform the following operations:

$$A \cdot B = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

$$B \cdot A = \begin{bmatrix} \underline{\quad} & \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 74 & 11 \\ -15 & -57 \end{bmatrix}$$

- $$\begin{bmatrix} 1 & 23 & 2 \\ 35 & 10 & -35 \\ -18 & -96 & 6 \end{bmatrix}$$

10. (1 point)

If A and B are 4×6 matrices, and C is a 7×4 matrix, which of the following are defined?

- A. CB
- B. $B - A$
- C. $CA - B$
- D. $A + C$
- E. AB

Correct Answers:

- AB

11. (1 point) Solve for X.

$$\begin{bmatrix} -2 & 6 & -6 \\ 1 & 6 & 5 \end{bmatrix} = -5X - 5 \begin{bmatrix} -5 & 4 & 7 \\ 5 & 5 & -1 \end{bmatrix}.$$

$$X = \begin{bmatrix} \underline{\quad} & \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 5.4 & -5.2 & -5.8 \\ -5.2 & -6.2 & 0 \end{bmatrix}$$

12. (1 point) Find a non-zero 2×2 matrix A such that $A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. (Your answer for A needs to be nonzero, which means it can have some zeros in it but not all zeros.)

$$A = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

Correct Answers:

- $$\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$$