

King Fahd University of Petroleum and Minerals

Prep-Year Math Program

Math 002 - Term 142

Recitation (9.7)

Question 1:

Let $A = \begin{bmatrix} -1 & 2 & 2 \\ 1 & 0 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 & 2 \\ 1 & 0 & 5 \\ 3 & -3 & -5 \end{bmatrix}$, and $C = \begin{bmatrix} 3 & -6 & -3 \\ 7 & -14 & -11 \\ -1 & 1 & 1 \end{bmatrix}$. Perform each

possible operation. If an operation is not possible, so state:

- $-2A$
- $A + B$
- CA
- $B^2 - 2C$

Answer: (a): $-2A = \begin{bmatrix} 2 & -4 & -4 \\ -2 & 0 & 4 \end{bmatrix}$

(b): $A + B$ is **not** possible because the dimension of A $2 \times 3 \neq$ dimension of B 3×3 .

(c): $C_{3 \times 3} A_{2 \times 3}$ is **not** possible (It is not conformable for multiplication) because the number of column of C is not equal to the number of row of A .

(d): $B^2 - 2C = \begin{bmatrix} 8 & 3 & -3 \\ 4 & 12 & -1 \\ -7 & 10 & 14 \end{bmatrix}$

Question 2: If $A = \begin{bmatrix} -1 & 2 & -3 \\ 6 & -1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 & 4 \\ -2 & 6 & -3 \end{bmatrix}$, then find the matrix X for which

$$4X + B = X - 2A .$$

Answer: $X = \begin{bmatrix} \frac{2}{3} & -1 & \frac{2}{3} \\ -\frac{10}{3} & -\frac{4}{3} & -\frac{1}{3} \end{bmatrix}$

Question 3: If A , B and C are $n \times n$ matrices and I_n is the identity matrix of order n , then which of the following statements is TRUE?

- $(A + I_n)(A - I_n) = A^2 - I_n^2$ **(True) because** $(A + I_n)(A - I_n) = A^2 - A + A - I_n^2 = A^2 - I_n^2$
- $(A - B)^2 = A^2 - 2AB + B^2$ (False)
- $A^2C = ACA$ (False)
- $(A + I_n)^2 = A^2 + I_n$ (False)
- $(A + B)(A^2 - AB + B^2) = A^3 + B^3$ (False)

Question 4: If $A = \begin{bmatrix} 1 & -2 & 0 \\ 3 & 0 & -1 \\ 1 & 1 & 4 \end{bmatrix}$, then the element in the third row and second column

of the matrix $A^3 + 3A$ is:

- A) 2 B) -2 C) -1 D) 7 E) 5