## For Problems 4-6

If A and B are two square matrices of order  $3 \times 3$  which satisfy AB = A and BA = B, then

- 4. Which of the following is true?
  - **a.** If matrix A is singular then matrix B is non-singular.
  - **b.** If matrix A is non-singular then matrix B is singular.
  - **c.** If matrix A is singular then matrix B is also singular.
  - d. Cannot say anything.
- 5.  $(A + B)^7$  is equal to

**a.** 
$$7(A + B)$$

**c.** 
$$64 (A + B)$$

**b.** 
$$7 \cdot I_{3 \times 3}$$

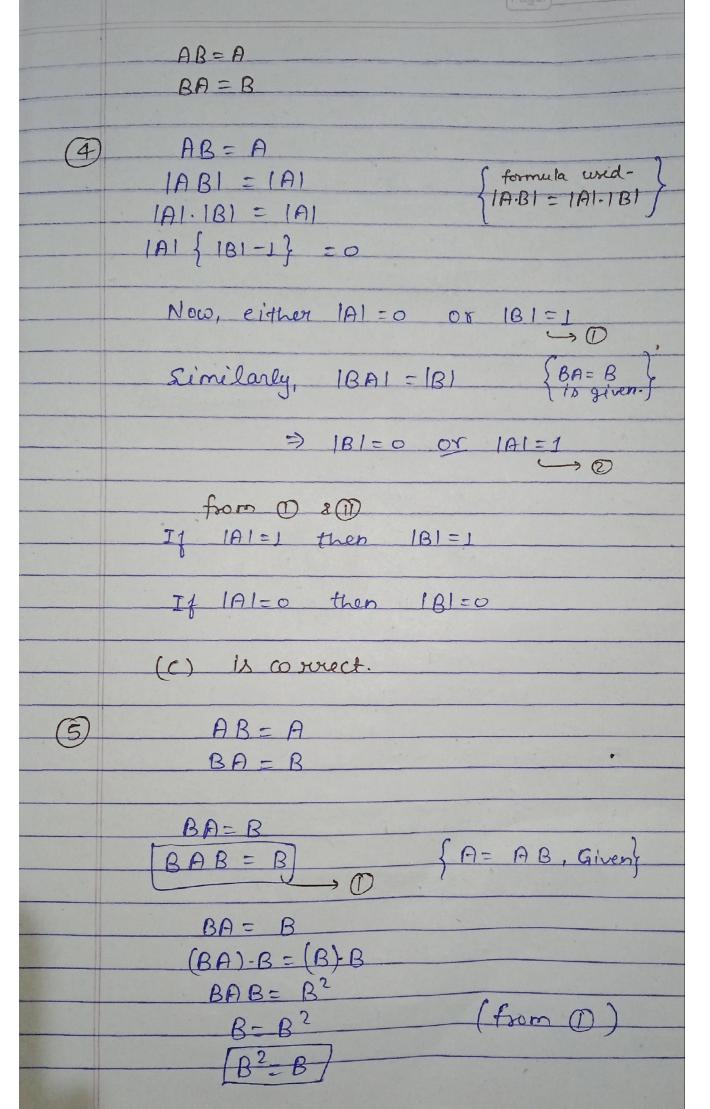
**6.**  $(A + I)^5$  is equal to (where I is identity matrix)

**a.** 
$$I + 60I$$

**b.** 
$$I + 16A$$

c. 
$$I + 31A$$

d. none of these



Similarly, [A2-A]

Now,  $(A+B)^2 = A^2 + B^2 + AB + BA$   $(A+B)^2 = A+B+A+B$  $(A+B)^2 = 2(A+B)$  = 30

> $(A+B)^3 = 2(A+B)^2$  $(A+B)^3 = 2^2(A+B)$  (from 2)

Thus, (A+B) = 2° (A+B) = 64 (A+B) Am.

(c) is convect.

(A+I) = I+5A+ JOA2 + 10A3 +5A4+A5 Expansion - simply using Benomeal Theorem.

because A. J. = J.A. I'm I whole n is a natural number of As proved in Q-6, A2=A A3= A2. A  $A^3 = A$ 

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Limilarly,  $A^4 = A$  $8 A^5 = A$ 

Now, (A+ I) = I + 5A+10A+10A+5A+A

= I + 31A

(c) is correct.

A Note: - If A & B are square matrices. of same order.

If A.B=B.A, (A+B) can be expanded using Binomeal Theorem.