Ans. to the Q.No 2

[i] It is given in the question that the ~~null~~ null space of A is a line, thus it can be interpreted that ~~is~~ it is 1. dimensional subspace. consider the rank nullity theorem:-

$$\rho(A) + \text{nullity}(A) = \dim(A)$$

Here. $\rho(A)$ is the rank of A.

Putting the values in the above equation

$$\rho(A) + 1 = 3$$

$$\rho(A) = 2$$

Hence ~~is~~ it can said that it is the dimension of its row or column space. Thuse it can be said that column space ~~com~~ cannot be a line, but it will ba a plane.

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Ans to the QNO-3

[I] Relating the Determinat to the ~~charact~~ characteristic Polynomial. the key to this Problem Lies in understanding the relationship between the determinant of a matrix and its characteristic Polynomial.

We know that. $P(\lambda) = \det(A-\lambda I)$. if we evalvete $P(0)$, we get: $P(0) = \det(A - 0I) = \det(A)$

* Evaluating the characteristic potymomil.
we are given $P(\lambda) = \lambda^3 - 2\lambda^3 + \lambda + 5$. To find the determinat of A we simply need to evaluate $P(0)$:

$P(0) = (0)^3 - 2(0^3) + (0) + 5 = 5$.

Therefore the determinant to matrix A dented as $\det(A)$, is .... 5g.

Ans. to. the. Q. NO. 1

[b] The Rank - Nullity Theorem :- the Rank - nullity Theorem states that for any matrix A the rank of A (A the dimension of the column space) equals the number or columns of A.

In summary.

matrix size	max Rank	min nullity
4 × 4	4	0
3 × 5	3	2
5 × 3	3	0