DETERMINANT OF SPECIAL MATRIX

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Abstract: Below mentioned property help to solve the special type of matrices as when you observe that you increase the order of matrix your general methodology is not work properly or it's too difficult but when you use the property you can simplify the matrix in short.

***Index Terms* – type of special matrices and example.**

I. Introduction

In linear algebra matrices is very important topic. In that topic we calculate the determinant of matrix by using normal method to is very difficult and so big. When we use the property give below then you can solve large determinant in very short procedure.

Property 1) Let A be a matrix such that

$A = [a_{ij}]_{n*n}$ if n is even.

Such that $a_{ij} = a$ $i = j$

$=b$ $i+j = n+1$

Then determinant of A is **$\Delta_{2n} = (a^2 - b^2)^n$**

Property2) Let A be a matrix such that

$A = [a_{ij}]_{n*n}$ if n is odd.

Such that a_{ij} $= a$ $i = j$ and $a_{(n+1)/2, (n+1)/2}$

$=b$ $i+j = n+1$

Then determinant of A is **$\Delta_{2n} = a(a^2 - b^2)^n$**

e.g 1) $A= [a_{ij}]_{5*5}$ such that

$a_{ij} = 2$ $i=j$

$=2$ $a_{(n+1)/2, (n+1)/2}$

$=3$ $i+j = n+1$

Find Determinant of A

Solution

$$A = \begin{bmatrix} 2 & 0 & 0 & 0 & 3 \\ 0 & 2 & 0 & 3 & 0 \\ 0 & 0 & 2 & 0 & 0 \\ 0 & 3 & 0 & 2 & 0 \\ 3 & 0 & 0 & 0 & 2 \end{bmatrix}$$

Then $\Delta_{2n+1} = 2(2^2 - 3^2)^n$

For Δ_5 we take n=2

$\Delta_{2(2)+1} = 2(2^2 - 3^2)^2$

$= 2(4-9)^2$

$= 2(5)^2$

$=2*25$

$=50$

There for determinant of A=50

References

[1] Applied Linear Algebra and Matrix Analysis by Thomas S. Shores.

[2]3000 Solved Problems in Linear Algebra by Seymour Lipschutz.