

Assignment 1

ATHAR JAVED

January 12, 2021

Question 1: Show that the matrix $B'AB$ is symmetric or skew symmetric according as A is symmetric or skew symmetric ?

Sol:

(a)when A is symmetric.

As A is symmetric matrix

$$A' = A \quad (1)$$

Taking $(B'AB)'$

Let

$$AB = P$$

Therefore

$$(B'AB)' = (B'P)'$$

$$(B'AB)' = P'(B')'$$

$$(B'AB)' = P'B$$

Putting $P=AB$

$$(B'AB)' = (AB)'B$$

$$(B'AB)' = B'A'(B)$$

$$(B'AB)' = B'AB \quad (2)$$

From Eq.2, it is clear that $B'AB$ is a Symmetric matrix.

(b)when A is skew symmetric.

As A is Skew symmetric matrix

$$A' = -A \quad (3)$$

Taking $(B'AB)'$

Let

$$AB = Q$$

Therefore

$$(B'AB)' = (B'Q)'$$

$$(B'AB)' = Q'(B)'$$

$$(B'AB)' = Q'B$$

Putting $Q=AB$

$$(B'AB)' = (AB)'B$$

$$(B'AB)' = B'A'(B)$$

$$(B'AB)' = B'(-A)B$$

$$(B'AB)' = -(B'AB) \tag{4}$$

From Eq.4, it is clear that $B'AB$ is a Skew Symmetric matrix.