Math 461 Matlab HW 2.

Recall the Matlab operations :
A' is the transpose of A ; inv(A) is the inverse of A ; A*B is the product of appropriately sized matrices.

In order to estimate the maximal difference between elements of two matrices A and B of the same size use
max(max(abs(A-B)))
The output is the entry of A-B with the largest absolute value. If it is quite small comparatively to the elements of A, then A and B are " practically equal " .

In the following problems explain your results based on respective facts from the Matrix Algebra and from the properties of determinants.
Do not print out matrices unnecessarily.

Problem 1. Generate two random 7×7 matrices A and B .
For each part below calculate matrices A_1, A_2, A_3, A_4 and determine which are equal.

1. $A_1 = AB, A_2 = BA, A_3 = (B^T A^T)^T, A_4 = (A^T B^T)^T$
2. $A_1 = A^T B^T, A_2 = B^T A^T, A_3 = (BA)^T, A_4 = (AB)^T$
3. $A_1 = A^{-1} B^{-1}, A_2 = B^{-1} A^{-1}, A_3 = (BA)^{-1}, A_4 = (AB)^{-1}$

Problem 2. Generate two random 8×8 matrices A and B and check whether or not the following holds.

1. $\det(AB) = (\det A)(\det B)$
2. $\det(A^{-1}) = \frac{1}{\det A}$
3. $\det(A + B) = (\det A) + (\det B)$
4. Let $triu(A)$ be the upper triangular part of A , $tril(A)$ its lower triangular part, and $diag(A)$ the vector which elements are elements of the main diagonal of A. Check whether or not the following holds.
   $\det A = prod(diag(A))$, $\det triu(A) = prod(diag(A))$, $\det tril(A) = prod(diag(A))$
5. Compare $(A^T)^{-1}$ with $(A^{-1})^T$