Determinants

Determinants are a great tool so long as you know the main tricks for manipulating them:

Give the definition of the determinant of an $n \times n$ matrix M. If matrices M and M' are related by

    (1) M' is the transpose of M,
    (2) M is the same as M' except two rows have been swapped,
    (3) M is the same as M' except two columns have been swapped,
    (4) M is the same as M' except λ times the kth row has been added to the jth row,
    (5) M is the same as M except one row has been multiplied by λ,
    (6) $M' = \lambda M$,

then for each case *state the relationship* between $\det M$ and $\det M'$. Also *give a proof* of the relationship you have stated.

Now let $M = I$, the identity matrix and let N be a $n \times m$ matrix. For each of the above cases calculate the matrix M' and explain how the matrix $M'N$ is related to N.