

**Homework assignment #3**

**Problem 1.** Evaluate the following determinants:

$$\begin{array}{lll} \text{(i)} \quad \begin{vmatrix} 5 & -2 \\ -8 & 4 \end{vmatrix}, & \text{(ii)} \quad \begin{vmatrix} 3 & 1 & 2 \\ 2 & 4 & 5 \\ 2 & 4 & 5 \end{vmatrix}, & \text{(iii)} \quad \begin{vmatrix} 4 & 3 & 0 \\ 3 & 1 & 2 \\ 5 & -1 & -4 \end{vmatrix}, \\ \text{(iv)} \quad \begin{vmatrix} 1 & 3 & 2 \\ 4 & 1 & -2 \\ 2 & 1 & 3 \end{vmatrix}, & \text{(v)} \quad \begin{vmatrix} 2 & -1 & 2 \\ 1 & 3 & 2 \\ 5 & 1 & 6 \end{vmatrix}, & \text{(vi)} \quad \begin{vmatrix} 2 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 1 & 6 & 2 & 0 \\ 1 & 1 & -2 & 3 \end{vmatrix}. \end{array}$$

**Problem 2.** Compute the determinant of the following matrix and state whether the matrix is invertible or singular:

$$\begin{pmatrix} 1 & 1 & 1 & 1 \\ 2 & -1 & 3 & 2 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 7 & 3 \end{pmatrix}.$$

**Problem 3.** Find all values of the parameter  $c$  that would make the following matrix singular:

$$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 9 & c \\ 1 & c & 3 \end{pmatrix}.$$

**Problem 4.** Let  $A$  and  $B$  be  $3 \times 3$  matrices with  $\det(A) = 4$  and  $\det(B) = 5$ . Compute the following determinants: (i)  $\det(2AB)$ , (ii)  $\det(AB^{-1}A)$ .