MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 6 **MATH 2050** DUE: TUE JULY 3

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1. For each of the following matrices find:
   1. the matrix of cofactors;
   2. the determinant using the cofactor (Laplace) expansion;
   3. the inverse matrix using the cofactors;

$$A = \begin{bmatrix} 10 & 2 \\ 5 & 4 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & -1 & 2 \\ -5 & 7 & -11 \\ -2 & 3 & -5 \end{bmatrix}. \qquad C = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 0 \\ 1 & 2 & 0 & 0 \\ 4 & 0 & 0 & 0 \end{bmatrix},$$

2. Find the determinant by rewriting the matrix in a triangular form

$$C = \begin{bmatrix} 1 & 1 & -3 & 4 & 1 \\ -3 & -1 & 11 & -11 & -3 \\ 1 & 2 & -3 & 7 & -2 \\ 2 & 1 & -6 & 8 & 3 \\ -2 & 0 & 6 & -7 & 0 \end{bmatrix}.$$

3. For which values of a the matrix $\begin{bmatrix} 2 & 1 & 3 \\ 0 & a+1 & 0 \\ a & 2 & 4 \end{bmatrix}$ is not invertable?

4. Let $\det A = 5$ and $\det B = 10$.

   A) Find $\det(B^3 A^2 B^{-1} A^T B^T)$.

   B) Given $\det(5A^{-1}B) = 6250$ find the size of the matrices.

5. True of False? Explain.

   a) If a matrix is skew symmetrix ($A^T = -A$) then it is not invertable.

   b) Every matrix such that $A^k = I$ for some $k \geq 1$ has determinant equal to one.

   c) Elementary row operations do not change the determinant of the matrix. (in other words, if A is obtained from B by an ERO then $\det A = \det B$.)

   d) There exist such matrices A, B, C for which $(ABC)^{-1} = A^{-1}B^{-1}C^{-1}$