MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 6 **MATH 2050 Sec.3** DUE: MONDAY OCT 29

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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;

$$A = \begin{bmatrix} 2a & a^2 \\ a^3 & a^4 \end{bmatrix}, \qquad B = \begin{bmatrix} 3 & -5 & 1 \\ 5 & -10 & 5 \\ 2 & 0 & -1 \end{bmatrix}, \qquad C = \begin{bmatrix} 1 & 0 & 0 & a \\ 0 & 1 & b & 0 \\ 0 & c & 1 & 0 \\ d & 0 & 0 & 1 \end{bmatrix}.$$

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

$$C = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 6 & 9 & 12 & 15 \\ 1 & 2 & 6 & 8 & 10 \\ 1 & 2 & 3 & 8 & 10 \\ 2 & 4 & 6 & 12 & 20 \end{bmatrix}.$$

3. Find conditions for a and b such that the matrix $\begin{bmatrix} 8 & a^2 & a \\ b & 7 & a \\ 0 & a-2b & 0 \end{bmatrix}$ is invertable?

4. Let $\det A = 3$, $\det B = 4$, and $\det C = 5$; and let A and B be 3×3 matrices , and C be 4×4. Find:

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

   $\det(2A^2) - \det(2B) + \det(2C)$;

   $\det(ABC)$.

5. True of False? Explain.

   a) If a matrix is symmetric ($A^T = A$) then it is invertable.

   b) If matrix is diagonal then it is invertable.

   c) Elementary row operations always change the determinant of the matrix.

   d) If A and B are invertable matrices then $((AB)^{-1})^T = (A^T)^{-1}(B^T)^{-1}$.