Determinants   **Math 231 - Workshop**

1. Below are some easy determinants. Look for a quick way to find each of these determinants.

   (a) $\det \begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$

   (b) $\begin{vmatrix} 2 & 3 & 6 \\ 0 & -3 & 7 \\ 0 & 0 & 1 \end{vmatrix}$

   (c) $\begin{vmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{vmatrix}$

2. Here are some harder determinants. For each of these use row-reduction or cofactor expansion (whichever looks easier) to find the determinant.

   (a) $\det \begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 2 & 2 \\ 1 & 1 & 3 & 3 \\ 1 & 1 & 1 & 4 \end{pmatrix}$

   (b) $\begin{vmatrix} 0 & 1 & 2 & -1 & 5 \\ -2 & 0 & 0 & 1 & 4 \\ 0 & 1 & 2 & -1 & 3 \\ 0 & 0 & 3 & 0 & 2 \\ 0 & 1 & 3 & 0 & 1 \end{vmatrix}$