Quiz 1

For each of the questions below use an appropriate technique to compute the determinants of the given matrices. Do not use your calculator for anything other than checking your answer (ie: show all steps).

1. (4 points) Given that $\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = -4$, compute the following:

   a. $\begin{vmatrix} 3a & 3b & 3c \\ -d & -e & -f \\ 2g & 2h & 2i \end{vmatrix} = \mathbf{3 \cdot (-1) \cdot 2} \begin{vmatrix} \boldsymbol{a} & \boldsymbol{b} & \boldsymbol{c} \\ \boldsymbol{d} & \boldsymbol{e} & \boldsymbol{f} \\ \boldsymbol{g} & \boldsymbol{h} & \boldsymbol{i} \end{vmatrix} = \mathbf{(-6)(-4) = 24}$

   b. $\begin{vmatrix} d & e & f \\ a & b & c \\ 2a+g & 2b+h & 2c+i \end{vmatrix} = \begin{vmatrix} \boldsymbol{d} & \boldsymbol{e} & \boldsymbol{f} \\ \boldsymbol{a} & \boldsymbol{b} & \boldsymbol{c} \\ \boldsymbol{g} & \boldsymbol{h} & \boldsymbol{i} \end{vmatrix} = - \begin{vmatrix} \boldsymbol{a} & \boldsymbol{b} & \boldsymbol{c} \\ \boldsymbol{d} & \boldsymbol{e} & \boldsymbol{f} \\ \boldsymbol{g} & \boldsymbol{h} & \boldsymbol{i} \end{vmatrix} = \mathbf{4}$

2. (6 points) Compute:

$$\begin{vmatrix} 1 & 3 & 1 & 5 & 3 \\ -2 & -7 & 0 & -4 & 2 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 2 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \end{vmatrix} = \begin{vmatrix} \mathbf{1} & \mathbf{3} & \mathbf{1} & \mathbf{5} & \mathbf{3} \\ \mathbf{0} & \mathbf{-1} & \mathbf{2} & \mathbf{6} & \mathbf{8} \\ \mathbf{0} & \mathbf{0} & \mathbf{1} & \mathbf{0} & \mathbf{1} \\ \mathbf{0} & \mathbf{0} & \mathbf{2} & \mathbf{1} & \mathbf{1} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{1} & \mathbf{1} \end{vmatrix} = \begin{vmatrix} \mathbf{1} & \mathbf{3} & \mathbf{1} & \mathbf{5} & \mathbf{3} \\ \mathbf{0} & \mathbf{-1} & \mathbf{2} & \mathbf{6} & \mathbf{8} \\ \mathbf{0} & \mathbf{0} & \mathbf{1} & \mathbf{0} & \mathbf{1} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{1} & \mathbf{-1} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{1} & \mathbf{1} \end{vmatrix}$$

$$= \begin{vmatrix} \mathbf{1} & \mathbf{3} & \mathbf{1} & \mathbf{5} & \mathbf{3} \\ \mathbf{0} & \mathbf{-1} & \mathbf{2} & \mathbf{6} & \mathbf{8} \\ \mathbf{0} & \mathbf{0} & \mathbf{1} & \mathbf{0} & \mathbf{1} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{1} & \mathbf{-1} \\ \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{2} \end{vmatrix} = \mathbf{(1)(-1)(1)(1)(2) = -2}$$