1. If $\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = 9$, find $\begin{vmatrix} 3a-5g & g & d \\ 3b-5h & h & e \\ 3c-5i & i & f \end{vmatrix}$.

   A. -45
   B. 45
   C. -27
   D. 9
   E. 27
   F. -9

2. Which of the following are bases for $\mathbf{R}^3$?

   (1) { (4, 2, 0), (0, 1, 2), (1, 3, -1) }
   (2) { (-1, 2, 3), (3, 3, 2) }
   (3) { (-1, 3, -5), (1, -2, 4), (2, 0, 4), (5, 1, 9) }

   A. (1) and (2)
   B. (1) only
   C. (2) and (3)
   D. None of them
   E. All three
   F. (2) only

3. Suppose $A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 0 & 1 \\ 2 & 1 & 4 \end{pmatrix}$. Which one of the following statements is true for A^{-1} ?

A. None of the below is true.
B. The second row is [1 2 -1].
C. The first row is [2 0 -1].
D. The third row is [-1 -1 1].
E. A^{-1} does not exist.
F. The second column is $[0 \ 2 \ -1]^t$.

4. Compute $\begin{pmatrix} -1 & 0 & -3 & 0 \\ 0 & -1 & 0 & -3 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}^{1001}$

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

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

C. $\begin{pmatrix} -1 & 0 & -3^{1001} & 0 \\ 0 & -1 & 0 & -3^{1001} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

D. $\begin{pmatrix} 1001 & 0 & -3003 & 0 \\ 0 & 1001 & 0 & -3003 \\ 0 & 0 & -1001 & 0 \\ 0 & 0 & 0 & -1001 \end{pmatrix}$

E. $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

F. $\begin{pmatrix} -1001 & 0 & -3003 & 0 \\ 0 & -1001 & 0 & -3003 \\ 0 & 0 & 1001 & 0 \\ 0 & 0 & 0 & 1001 \end{pmatrix}$

5. If $K = \{A \quad M_{33} \mid A = -A^t\}$ is the subspace of anti-symmetric 3 by 3 matrices, then dim K is:

A. 3
B. 2
C. 6
D. 9
E. 4
F. 0

6. Find all (a, b, c) so that $\begin{pmatrix} a & 1 & b & b & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & c \end{pmatrix}$ is in reduced row-echelon form.

A. (0, 0, 1)
B. (1, 0, 0)
C. (1, 1, 1)
D. (0, 0, 0)
E. (1, 0, 0) and (0, 0, 1)
F. (1, 0, 0) and (0, 0, 0)