1.   Find the value of the constant a for which the following system is inconsistent

$$x + y + z = 1$$
$$2x + ay + 3z = 1$$
$$y - z = 1$$

A. $a = -4$
B. $a = -1$
C. $a = 2$
D. $a = -2$
E. $a = 1$
F. $a = 0$

2. Which of $U = \{ (x, y, x-y) \mid x, y \in \mathbf{R} \}$, $V = \{ (x, y, x+y) \mid x, y \in \mathbf{R} \}$ and
$W = \{ (x, y, xy) \mid x, y \in \mathbf{R} \}$ are subspaces of $\mathbf{R}^3$?

        A.   U and V only
        B.   V only
        C.   U and W only
        D.   W only
        E.   U only
        F.   V and W only

3.   Which of the following is (are) a basis (bases) of $\mathbf{R}^3$?

(1)   { (1, 0, 1)   (1, 4, 0)   (-4, -4, 7) }
(2)   { (3, -1, 2)   (5, 1, 1)}
(3)   { (2, 1, 3)   (3, 1, -3)   (1, 1, 9) }

A.   None is a basis.
B.   2 and 3.
C.   Only 1.
D.   1 and 3 .
E.   Only 3.
F.   1 and 2.

4.   If A = $\begin{array}{ccc} 1 & 1 & 1 \\ 0 & 2 & 3 \\ 5 & 5 & 1 \end{array}$, what is the second row of A^{-1} ?

A.   [-15/8, 1/2, 3/8]
B.   [-15/4, 1, 3/4]
C.   [13/8, -1/2, -1/8]
D.   [-1/2, 1/2, 0]
E.   [-15/8, 1/8, 3/8]
F.   [-15, 4, 3]

Please record your answers on the title page.

5. For which value(s) of x is $\begin{array}{ccc} 1 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & x \end{array}$ invertible?

    A.   x   0

    B.   x = -1

    C.   x = 1

    D.   x   1

    E.   x   ± 1

    F.   x   -1

6. A is an 8 by 6 matrix such that Ax = 0 has only the trivial solution, x = 0. Answer the following questions:

   • What is the rank of A?
   • Is Ax = b consistent for all b $\in$ $\mathbf{R}^8$?

   A. 0, Yes
   B. 8, No
   C. 2, Yes
   D. 6, No
   E. 6, Yes
   F. 8, Yes