Multiple-Choice Test

Chapter 04.01
Background Simultaneous Linear Equations

1. Given $[A] = \begin{bmatrix} 6 & 2 & 3 & 9 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 4 & 5 \\ 0 & 0 & 0 & 6 \end{bmatrix}$ then $[A]$ is a (an) _____ matrix.

   (A) diagonal
   (B) identity
   (C) lower triangular
   (D) upper triangular

2. A square matrix $[A]$ is lower triangular if
   (A) $a_{ij} = 0, j > i$
   (B) $a_{ij} = 0, i > j$
   (C) $a_{ij} \neq 0, i > j$
   (D) $a_{ij} \neq 0, j > i$

3. Given

$$[A] = \begin{bmatrix} 12.3 & -12.3 & 20.3 \\ 11.3 & -10.3 & -11.3 \\ 10.3 & -11.3 & -12.3 \end{bmatrix}, \quad [B] = \begin{bmatrix} 2 & 4 \\ -5 & 6 \\ 11 & -20 \end{bmatrix}$$

   then if

$$[C] = [A][B], \text{ then}$$

$c_{31} =$ _____

   (A) -58.2
   (B) -37.6
   (C) 219.4
   (D) 259.4

4. The following system of equations has _____ solution(s).

$$x + y = 2$$
$$6x + 6y = 12$$

(A) infinite
(B) no
(C) two
(D) unique

5. Consider there are only two computer companies in a country. The companies are named Dude and Imac. Each year, Dude keeps 1/5th of its customers, while the rest switch to Imac. Each year, Imac keeps 1/3rd of its customers, while the rest switch to Dude. If in 2003, Dude had 1/6th of the market and Imac had 5/6th of the market, what will be the share of Dude computers when the market becomes stable?

(A) 37/90
(B) 5/11
(C) 6/11
(D) 53/90

6. Three kids - Jim, Corey and David receive an inheritance of $2,253,453. The money is put in three trusts but is not divided equally to begin with. Corey's trust is three times that of David's because Corey made an A in Dr. Kaw's class. Each trust is put in an interest generating investment. The three trusts of Jim, Corey and David pays an interest of 6%, 8%, 11%, respectively. The total interest of all the three trusts combined at the end of the first year is $190,740.57. The equations to find the trust money of Jim (J), Corey (C) and David (D) in a matrix form is

(A) $$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 3 & -1 \\ 0.06 & 0.08 & 0.11 \end{bmatrix} \begin{bmatrix} J \\ C \\ D \end{bmatrix} = \begin{bmatrix} 2{,}253{,}453 \\ 0 \\ 190{,}740.57 \end{bmatrix}$$

(B) $$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & -3 \\ 0.06 & 0.08 & 0.11 \end{bmatrix} \begin{bmatrix} J \\ C \\ D \end{bmatrix} = \begin{bmatrix} 2{,}253{,}453 \\ 0 \\ 190{,}740.57 \end{bmatrix}$$

(C) $$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & -3 \\ 6 & 8 & 11 \end{bmatrix} \begin{bmatrix} J \\ C \\ D \end{bmatrix} = \begin{bmatrix} 2{,}253{,}453 \\ 0 \\ 190{,}740.57 \end{bmatrix}$$

(D) $$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 3 & -1 \\ 6 & 8 & 11 \end{bmatrix} \begin{bmatrix} J \\ C \\ D \end{bmatrix} = \begin{bmatrix} 2{,}253{,}453 \\ 0 \\ 19{,}074{,}057 \end{bmatrix}$$

For a complete solution, refer to the links at the end of the book.