

**Multiple-Choice Test – Background Simultaneous Linear Equations**  
**Autar Kaw**

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

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

$$c_{31} = \underline{\hspace{2cm}}$$

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



(D) 259.4

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Page 2 of 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

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

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

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

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

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Page 4 of 4