Values

[7]   5.   Given that each of the matrices

$$A = \begin{bmatrix} 1 & 2 & 0 & -3 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 0 & 4 \\ 0 & 1 & -2 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad \text{and} \quad C = \begin{bmatrix} 1 & -3 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 6 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

is the reduced row-echelon form of an augmented matrix of a linear system

a) Indicate the number of solutions of each of the corresponding systems by placing an X in the following table:

	A	B	C
Unique solution		X	
No solution	X		
Infinitely many solutions			X

b) For each of the systems that has solutions, find the solution set.

B : $x_1 = 4$, $x_2 = -2$

C : $x_2 = t$, $x_4 = s$

$x_3 = 6 - s$

$x_1 = 3t$

$S = \{ (3t, t, 6-s, s) : -\infty < t < \infty, -\infty < s < \infty \}$

Values

[11]   6.   If $A=\begin{bmatrix} 1 & 1 \\ 0 & 5 \\ -2 & -3 \end{bmatrix}$, $B=\begin{bmatrix} 3 & 1 \\ -2 & 4 \end{bmatrix}$ and $C=[4 \ \ 1 \ \ 3]$, compute each of the following expressions, or show why it is not defined:

a) $A(B^T - 2B)$,

$(3\times2)(2\times2 - 2\times2) = (3\times2)(2\times2) = 3\times2$

$B^T - 2B = \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} - \begin{bmatrix} 6 & 2 \\ -4 & 8 \end{bmatrix} = \begin{bmatrix} -3 & -4 \\ 5 & -4 \end{bmatrix}$

$A(B^T - 2B) = \begin{bmatrix} 1 & 1 \\ 0 & 5 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} -3 & -4 \\ 5 & -4 \end{bmatrix} = \begin{bmatrix} 2 & -8 \\ 25 & -20 \\ -9 & 20 \end{bmatrix}$

b) $CA + 3B^T$,

$(1\times3)(3\times2) + (2\times2) = (1\times2) + (2\times2)$ NOT POSSIBLE

c) $(CA)B$,

$((1\times3)(3\times2))(2\times2) = (1\times2)(2\times2) = 1\times2$

$CA = [4 \ 1 \ 3] \begin{bmatrix} 1 & 1 \\ 0 & 5 \\ -2 & -3 \end{bmatrix} = [-2 \ \ 0]$

$[-2 \ \ 0] \begin{bmatrix} 3 & 1 \\ -2 & 4 \end{bmatrix} = [-6 \ \ -2]$

d) $BA^T + CA$.

$(2\times2)(2\times3) + (1\times3)(3\times2) = (2\times3) + (1\times2)$

NOT   POSSIBLE