UNISUL – Universidade do Sul de Santa Catarina – Braço do Norte
Curso: Ciência da Computação NOÇÕES DE ALGEBRA LINEAR
Primeira Avaliação – 08/09/2016
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9,9

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1 – Para as matrizes A e B, calcule o que se pede

Matrizes: $A = \begin{pmatrix} 2 & 3 & 2 \\ -1 & -5 & -2 \\ 0 & 2 & 4 \end{pmatrix}$ $B = \begin{pmatrix} 1 & 0 & 1 \\ 3 & -1 & 5 \\ 2 & 4 & 0 \end{pmatrix}$

Calcular

1,9

a) -0,5A-2B
b) -A*(0,2B)
c) A^T

2 – Para as matrizes abaixo determine quais produtos são possíveis e, para aqueles que são possíveis, determine o número de linhas e colunas da matriz resultante.

2

Matrizes: $A = (b \quad a); B = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}; C = \begin{pmatrix} 0 & -1 \\ -9 & 1 \end{pmatrix}; D = (1 \ -1 \ \ 3); E = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$

3 – Calcule o determinante das matrizes abaixo.

2

Matrizes: $A = \begin{pmatrix} 7 & -4 \\ 2 & 1 \end{pmatrix}; B = \begin{pmatrix} 3 & 0 & 1 \\ -2 & -1 & 0 \\ 1 & 2 & 1 \end{pmatrix}; C = \begin{pmatrix} 9 & -1 & 8 \\ 4 & -8 & -9 \\ 5 & 7 & 17 \end{pmatrix}$

4 – Calcule o determinante das matrizes abaixo usando o método dos cofatores.

2

Matrizes: $A = \begin{pmatrix} 1 & 2 & 0 \\ 0 & 1 & 4 \\ 1 & 2 & 1 \end{pmatrix}; B = \begin{pmatrix} 2 & 2 & 0 \\ 0 & 2 & 4 \\ 0 & 2 & 2 \end{pmatrix}$

5 – Resolva o sistema linear

1

a) Usando o método de Gauss-Jordan;
b) Resolva o mesmo sistema usando o método de Cramer.

1

Sistema linear: $\begin{cases} 2x_1 + 2x_2 + x_3 = 3 \\ x_1 - x_2 + 3x_3 = 13 \\ x_1 + 3x_3 = 11 \end{cases}$

Bom Trabalho!!!

$2.2 + 2(-2) + 3 = 3$ $\qquad$ $2 + 3.3 = 11$

$2 - (-2) + 3.3 = 13$ $\qquad$ $11 = 11$

$4 + 9 = 13$

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1. $A = \begin{pmatrix} 2 & 3 & 2 \\ -1 & -5 & -2 \\ 0 & 2 & 4 \end{pmatrix}$ $B = \begin{pmatrix} 1 & 0 & 1 \\ 3 & -1 & 5 \\ 2 & 4 & 0 \end{pmatrix}$

a) $-0{,}5A - 2B = \begin{vmatrix} -3 & -1{,}5 & -3 \\ -5{,}5 & 4{,}5 & -9 \\ -4 & -9 & -2 \end{vmatrix}$ C

$\begin{vmatrix} -1 & -1{,}5 & -1 \\ 0{,}5 & 2{,}5 & 1 \\ 0 & -1 & -2 \end{vmatrix} - \begin{vmatrix} 2 & 0 & 2 \\ 6 & -2 & 10 \\ 4 & 8 & 0 \end{vmatrix}$

$\begin{vmatrix} -3 & -1{,}5 & -3 \\ -5{,}5 & 4{,}5 & -9 \\ -4 & -9 & -2 \end{vmatrix}$

b) $-A * (0{,}2B) = \begin{vmatrix} \cancel{-}3 & -1 & -3{,}4 \\ 4 & 0{,}6 & \cancel{5{,}2} \\ -2{,}8 & -2{,}8 & -2 \end{vmatrix}$

$\begin{vmatrix} -2 & -3 & -2 \\ 1 & 5 & 2 \\ 0 & -2 & -4 \end{vmatrix} * \begin{vmatrix} 0{,}2 & 0 & 0{,}2 \\ 0{,}6 & -0{,}2 & 1 \\ 0{,}4 & 0{,}8 & 0 \end{vmatrix}$

$-0{,}4 \quad -1{,}8 \quad -0{,}8$ $\quad 0 \quad 0{,}6 \quad -1{,}6$ $\quad -0{,}4 \quad -3$

$-2 . 0{,}2 + (-3) . 0{,}6 + (-2) . 0{,}4$ $\quad -2 . 0 + (-3) . (-0{,}2) + (-2) . 0{,}8$ $\quad -2 . 0{,}2 + (-3) . 1 + (-2) . 0$

$0{,}2 \; 3 \; +0{,}8$ $\quad 1 . 0{,}2 + 5 . 0{,}6 + 2 . 0{,}4$ $\quad -1 \; +1{,}6 \quad 1 . 0 + 5 . (-0{,}2) + 2 . 0{,}8$ $\quad 1 . 0{,}2 + 5 . 1 + 2 . 0$

$0 . 0{,}2 + (-2) . 0{,}6 + (-4) . 0{,}4$ $\quad 0 . 0 + (-2) . (-0{,}2) + (-4) . 0{,}8$ $\quad 0 . 0{,}2 + (-2) . 1 + (-4) . 0$

$-1{,}2 \quad -1{,}6$ $\quad 0{,}4 \quad -3{,}2$ $\quad -2$

$\begin{pmatrix} 3 & -1 & -3{,}4 \\ 4 & 0{,}6 & 5 \\ -2{,}8 & -2{,}8 & -2 \end{pmatrix}$

c) $A^T = \begin{vmatrix} 2 & -1 & 0 \\ 3 & -5 & 2 \\ 2 & -2 & 4 \end{vmatrix}$

$$\begin{vmatrix} 2 & -1 & 0 \\ 3 & -5 & 2 \\ -2 & -2 & 4 \end{vmatrix}$$

2. $A = 1\times 2$
$B = 3\times 3$
$C = 2\times 2$
$D = 1\times 3$
$E = 2\times 1$

Será possível os matrizes:

A^*C: $1\times\boxed{2}\ \boxed{2}\times 2 \rightarrow 2\times 2$

D^*B: $1\times\boxed{3}\ \boxed{3}\times 3 \rightarrow 3\times 3$

C^*E: $2\times\boxed{2}\ \boxed{2}\times 1 \rightarrow 2\times 2$

E^*D: $2\times\boxed{1}\ \boxed{1}\times 3 \rightarrow 1\times 1$

E^*A: $2\times\boxed{1}\ \boxed{1}\times 2 \rightarrow 1\times 1$

3. $A = \begin{vmatrix} 7 & -4 \\ 2 & 1 \end{vmatrix}$

$$7 - (-8) = \boxed{15}$$

$$B = \left|\begin{matrix} 3 & 0 & 1 \\ -2 & -1 & 0 \\ 1 & 2 & 1 \end{matrix}\right| \begin{matrix} 3 & 0 \\ -2 & -1 \\ 1 & 2 \end{matrix}$$

$$-1 + 0 + 0 - (-3) - 0 - (-4)$$
$$-1 + 3 + 4$$
$$\boxed{6}$$

$$C = \left|\begin{matrix} 9 & -1 & 8 \\ 4 & -8 & -9 \\ 5 & 7 & 17 \end{matrix}\right| \begin{matrix} 9 & -1 \\ 4 & -8 \\ 5 & 7 \end{matrix}$$

$-320 \; -567 - 68 - (-1224) - 45 \; -224$

$-955 + 1224 - 269$

$-1224 + 1224 =$

$\boxed{0}$

4. $A = \left|\begin{matrix} 1 & 2 & 0 \\ 0 & 1 & 4 \\ 1 & 2 & 1 \end{matrix}\right|$

$1.(-1)^{1+1}.(1.1 - 4.2)$

$1 \; . \; (1 - 8)$

$1 \; . \; -7$

-7

$2.(-1)^{1+2}.(0.1 - 4.1)$

$-2 \; . \; -4$

8

$-7 + 8 = \boxed{1}$

$0.(-1)^{1+3}.(0.2 - 1.1)$

$0. \; -1$

0

$B = \left|\begin{matrix} 2 & 2 & 0 \\ 0 & 2 & 4 \\ 0 & 2 & 2 \end{matrix}\right|$

$2.(-1)^{1+1}.(2.2 - 4.2)$

$2 \; . \; (4 - 8)$

$2 \; . \; -4$

-8

$-8 + 0 + 0 = \boxed{-8}$

$2.(-1)^{1+2}.(0.2 - 0.4)$

$-2 \; . \; 0$

0

$0.(-1)^{1+3}.(0.2 - 2.0)$

$0 \; . \; 0$

0

4.0

0

5.a)
$$\left|\begin{array}{ccc:c} 2 & 2 & 1 & 3 \\ 1 & -1 & 3 & 13 \\ 1 & 0 & 3 & 11 \end{array}\right| \begin{array}{l} \\ L_2 - L_3 \\ \\ \end{array}$$

$$\left|\begin{array}{ccc:c} 2 & 2 & 1 & 3 \\ 0 & -1 & 0 & 2 \\ 1 & 0 & 3 & 11 \end{array}\right| \begin{array}{l} \\ \\ L_3 \cdot -2 \end{array}$$

$$\left|\begin{array}{ccc:c} 2 & 2 & 1 & 3 \\ 0 & -1 & 0 & 2 \\ -2 & 0 & -6 & -22 \end{array}\right| \begin{array}{l} \\ \\ L_1 + L_3 \end{array}$$

$$\left|\begin{array}{ccc:c} 2 & 2 & -1 & 3 \\ 0 & -1 & 0 & 2 \\ 0 & 2 & -5 & -19 \end{array}\right| \begin{array}{l} \\ \\ 2L_2 + L_3 \end{array}$$

$$\boxed{\begin{array}{l} x_1 = 2 \\ x_2 = -2 \\ x_3 = 3 \end{array}}$$

$$\left|\begin{array}{ccc:c} 2 & 2 & 1 & 3 \\ 0 & -1 & 0 & 2 \\ 0 & 0 & -5 & -15 \end{array}\right| \begin{array}{l} L_1/2 \\ L_2(x-1) \\ L_3(x-1) \end{array}$$

$$\left|\begin{array}{ccc:c} 1 & 1 & 0,5 & 1,5 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 5 & 15 \end{array}\right| \begin{array}{l} \\ \\ L_3/5 \end{array}$$

$x = 2$
$y = -2$
$z = 3$

$$\left|\begin{array}{ccc:c} 1 & 1 & 0,5 & 1,5 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 3 \end{array}\right|$$
$$\begin{array}{ccc} x & y & z \end{array}$$

$z = 3$
$y = -2$
$x + y + 1,5 = 1,5$
$x = \cancel{1,5} - \cancel{1,5} + 2$
$x = +2$

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5\. b)

$$\begin{array}{cccc} 2 & 2 & 1 & = 3 \\ 1 & -1 & 3 & = 13 \\ 1 & 0 & 3 & = 11 \end{array}$$

$$\left|\begin{array}{ccc|cc} 2 & 2 & 1 & 2 & 2 \\ 1 & -1 & 3 & 1 & -1 \\ 1 & 0 & 3 & 1 & 0 \end{array}\right.$$

$-1 + 0 + 6 - (-6) - 6 - 0$

$5 + 6 - 6$

$\det A = 5$

$$\det A_x = \left|\begin{array}{ccc|cc} 3 & 2 & 1 & 3 & 2 \\ 13 & -1 & 3 & 13 & -1 \\ 11 & 0 & 3 & 11 & 0 \end{array}\right.$$

$-11 + 0 + 78 - (-9) - 66 - 0$

$67 + 9 - 66$

$76 - 66$

10

$\frac{10}{5} = \boxed{2}$

$$\det A_y = \left|\begin{array}{ccc|cc} 2 & 3 & 1 & 2 & 3 \\ 1 & 13 & 3 & 1 & 13 \\ 1 & 11 & 3 & 1 & 11 \end{array}\right.$$

$13 + 66 + 9 - 78 - 9 - 11$

$88 - 98$

-10

$\frac{-10}{5} = \boxed{-2}$

$$\det A_z = \left|\begin{array}{ccc|cc} 2 & 2 & 3 & 2 & 2 \\ 1 & -1 & 13 & 1 & -1 \\ 1 & 0 & 11 & 1 & 0 \end{array}\right.$$

$-3 + 0 + 22 + 22 - 26 - 0$

$44 - 29$

15

$\frac{15}{5} = \boxed{3}$

$$\boxed{\begin{array}{l} x_1 = 2 \\ x_2 = -2 \\ x_3 = 3 \end{array}}$$