Lista 2 Algebra Linear

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Curso: Ciência da computação

1-

a) todas etapas feitas no papel

b) resolução na imagem no final do pdf

```
B = [2 0  9 0 -7; 6 5 33 4 -24; 2 -5 10 2 1; -8 10 11 47 65];

mi =  -(B(2,1)/B(1,1));
L2 = B(1, :) * mi + B(2, :);
B(2, :) = L2;

mi = -(B(3,1) / B(1,1));
L3 = B(1, :)* mi + B(3, :);
B(3, :) = L3;


mi = -(B(4, 1) / B(1,1));
L4 = B(1, :)*mi + B(4, :);
B(4, :) = L4;


mi = -(B(3,2) / B(2,2));
L3 = B(2, :)*mi + B(3, :);
B(3, :) = L3;

mi = -(B(4, 2) / B(2,2));
L4 = B(2, :)*mi + B(4, :);
B(4, :) = L4;


mi = -(B(4, 3) / B(3,3));
L4 = B(3, :)*mi + B(4, :);
B(4, :) = L4;
```

C) resolução na imagem no final do pdf

```
B = [21 -3 4 9 -23 -52; -84 19 -18 -36 92 216
     -42 27 -20  -14 46 126; 21 -24 4 16 -21 -56;
     84 2 42 25 -94 -156];

mi =  -(B(2,1)/B(1,1));
L2 = B(1, :) * mi + B(2, :);
B(2, :) = L2;

mi = -(B(3,1) / B(1,1));
L3 = B(1, :)* mi + B(3, :);
B(3, :) = L3;


mi = -(B(4, 1) / B(1,1));
L4 = B(1, :)*mi + B(4, :);
B(4, :) = L4;

mi = -(B(5, 1) / B(1,1));
L5 = B(1, :)*mi + B(5, :);
B(5, :) = L5;

mi = -(B(3,2) / B(2,2));
L3 = B(2, :)*mi + B(3, :);
B(3, :) = L3;

mi = -(B(4, 2) / B(2,2));
L4 = B(2, :)*mi + B(4, :);
B(4, :) = L4;


mi = -(B(4, 3) / B(3,3));
L4 = B(3, :)*mi + B(4, :);
B(4, :) = L4;


mi = -(B(5, 2) / B(2,2));
L5 = B(2, :)*mi + B(5, :);
B(5, :) = L5;


mi = -(B(5, 3) / B(3,3));
L5 = B(3, :)*mi + B(5, :);
B(5, :) = L5;

mi = -(B(5, 4) / B(4,4));
L5 = B(4, :)*mi + B(5, :);
B(5, :) = L5;
```

5)

```
function [C] = multi_matriz(A,B)
  [m, n] = size(A);
  [p, q] = size(B);
  C = zeros(m, q);
  if(n != p)
    error("OPERAÇÃO INVÁLIDA");
  else
    for i=1:m
      for j=1:q
        for k=1:n
          C(i,j) += A(i, k) * B(k, j);
        endfor
      endfor
    endfor
   endif
 endfunction
```

6)transposta

```
function [C] = transposta(A)
  [m,n] = size(A);
  for i=1:m
    for j=1:n
      C(i,j) = A(j, i);
    endfor
  endfor
```

resolução das questões

1- Triangularizar os seguintes sistemas lineares empregando o algoritmo de eliminação. Em seguida, resolvê-los e calcular o determinante.

a) $12x_1 + 3x_2 - 4x_3 = 11$
$24x_1 - x_2 - 6x_3 = 29$
$-12x_1 - 17x_2 + 14x_3 = 45$

12	3	-4	11	
24	-1	-6	29	
-12	-17	14	45	

$a_{11} = 12$, $a_{21} = 24$

$p = -\frac{24}{12} = -2$ → $(12\ 3\ -4\ 11)\cdot(-2) \rightarrow (-24\ -6\ -8\ -22)$

$(24\ -1\ -6\ 29)$

$(0\ -7\ -14\ 7) = L2$

$a_{11} = 12$, $a_{31} = -12$

$p = -\frac{(-12)}{12} = 1$ $(12\ 3\ -4\ 11)\cdot 1 \rightarrow (12\ 3\ -4\ 11)$

$(-12\ -17\ 14\ 45)$

$(0\ -14\ 10\ 56) = L3$

$a_{22} = -7$, $a_{32} = -14$

$p = -\frac{(-14)}{-7} = -2$ → $(0\ -7\ -14\ 7)\cdot(-2) =$

$(0\ +14\ -28\ 14) +$

$(0\ -14\ 10\ 56)$

$(0\ 0\ 38\ 42)$

12	3	-4	11
0	-7	-14	7
0	0	38	42

$38x_3 = 42$

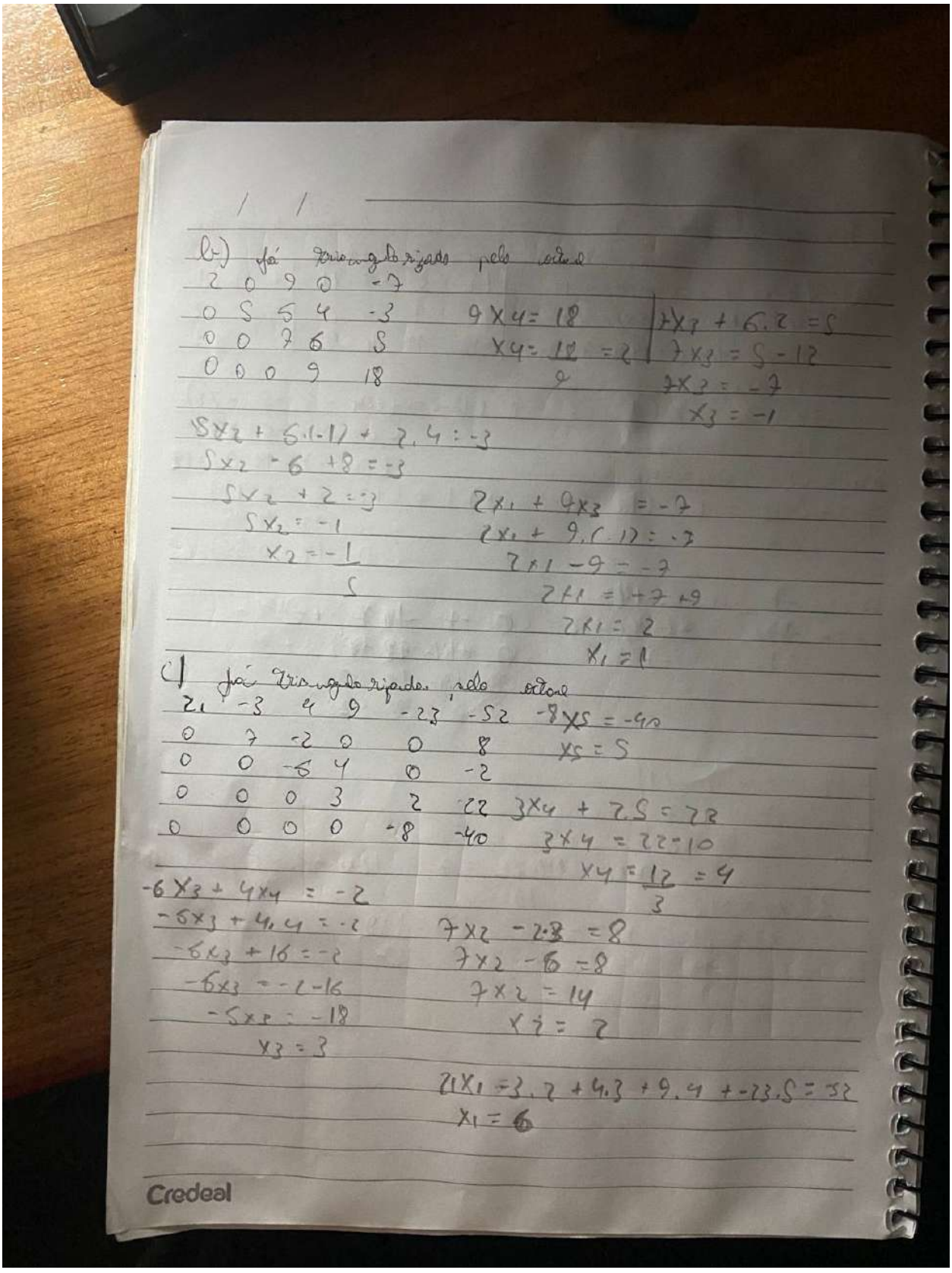
$x_3 = \frac{21}{19}$

$-7x_2 - 14\cdot\frac{21}{19} = 7$

$x_2 = -\frac{51}{19}$

$12x_1 + 3\cdot\frac{-51}{19} - 4\cdot\frac{21}{19} = 11$

$x_1 = \frac{119}{57}$



b) já triangularizada pela esteira

$$\begin{array}{ccccc} 2 & 0 & 9 & 0 & -7 \\ 0 & 5 & 5 & 4 & -3 \\ 0 & 0 & 7 & 6 & 5 \\ 0 & 0 & 0 & 9 & 18 \end{array}$$

$9x_4 = 18$

$x_4 = \frac{18}{9} = 2$

$7x_3 + 6.2 = 5$

$7x_3 = 5 - 12$

$7x_3 = -7$

$x_3 = -1$

$5x_2 + 5.(-1) + 2.4 = -3$

$5x_2 - 6 + 8 = -3$

$5x_2 + 2 = -3$

$5x_2 = -1$

$x_2 = -\frac{1}{5}$

$2x_1 + 9x_3 = -7$

$2x_1 + 9.(-1) = -7$

$2x_1 - 9 = -7$

$2x_1 = +7 + 9$

$2x_1 = 2$

$x_1 = 1$

c) já triangularizada, pela esteira

$$\begin{array}{cccccc} 2 & -3 & 4 & 9 & -23 & -52 \\ 0 & 7 & -2 & 0 & 0 & 8 \\ 0 & 0 & -6 & 4 & 0 & -2 \\ 0 & 0 & 0 & 3 & 2 & 22 \\ 0 & 0 & 0 & 0 & -8 & -40 \end{array}$$

$-8x_5 = -40$

$x_5 = 5$

$3x_4 + 2.5 = 22$

$3x_4 = 22 - 10$

$x_4 = \frac{12}{3} = 4$

$-6x_3 + 4x_4 = -2$

$-6x_3 + 4.4 = -2$

$-6x_3 + 16 = -2$

$-6x_3 = -2 - 16$

$-6x_3 = -18$

$x_3 = 3$

$7x_2 - 2.3 = 8$

$7x_2 - 6 = 8$

$7x_2 = 14$

$x_2 = 2$

$2x_1 - 3.2 + 4.3 + 9.4 + -23.5 = 52$

$x_1 = 6$

Credeal

2- Use a redução de Gauss - Jordan para resolver os sistemas.

a) $x_1 + x_2 = -1$
$4x_1 - 3x_2 = 3$

$$C = \begin{vmatrix} 1 & 1 & -1 \\ 4 & -3 & 3 \end{vmatrix} \quad a_{11} = 1 \quad a_{21} = 4$$

$m_1 = -(4/1) = -4$

$L_2 = (L_1) \cdot m_1 + (L_2) = 0 \quad -7 \quad 7$

$L_2 = L_2 / (-7) \Rightarrow 0 \quad 1 \quad -1 = L_2$

$L_1 = L_2 \cdot (-1) + (L_1) = 1 \quad 0 \quad 0$

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & -1 \end{vmatrix} \quad x_1 = 0 \text{ e } x_2 = -1$$

b) $x_1 + 3x_2 + x_3 + x_4 = 3$
$2x_1 - 2x_2 + x_3 + 2x_4 = 8$
$3x_1 + x_2 + 2x_3 - x_4 = -1$

$$\begin{vmatrix} 1 & 3 & 1 & 1 & 3 \\ 2 & -2 & 1 & 2 & 8 \\ 3 & 1 & 2 & -1 & -1 \end{vmatrix}$$

$m_1 = -(2/1) = -2$

$L_2 = L_1 \cdot m_1 + L_2 = 0 \quad -8 \quad -1 \quad 0 \quad -2$

$m_1 = -(3/1) = -3$

$L_3 = L_1 \cdot m_1 + L_3 = 0 \quad -8 \quad -1 \quad -4 \quad -10$

$L_2 = L_2 / L_3 = 0 \quad 1 \quad 0 \quad 0 \quad 1/2$

$L_3 = L_3 / L_2 = 0 \quad 1 \quad 1 \quad 0 \quad 2$

$$\begin{vmatrix} 1 & 3 & 1 & 1 & 3 \\ 0 & 1 & 1 & 0 & 1/2 \\ 0 & 1 & 1 & 0 & 2 \end{vmatrix}$$

c) $\left|\begin{array}{cccc|c} 1 & 1 & 1 & 0 & m_1 = -(1/1) = -1 \\ 1 & -1 & -1 & 0 & L_2 = L_1 \cdot m_1 + L_2 = 0 \ -2 \ -2 \ 0 \end{array}\right.$

$L_2 = L_2 / -2 = 0 \ 1 \ 1 \ 0$

$L_1 = L_1 - L_2 = 1 \ 0 \ 0 \ 0$

$\left|\begin{array}{cccc|c} 1 & 0 & 0 & 0 & x_1 = 0 \ x_3 = 0 \\ 0 & 1 & 1 & 0 & x_2 = 0 \end{array}\right.$

3) Quais estão na linha forma degrau e linha degrau reduzida.

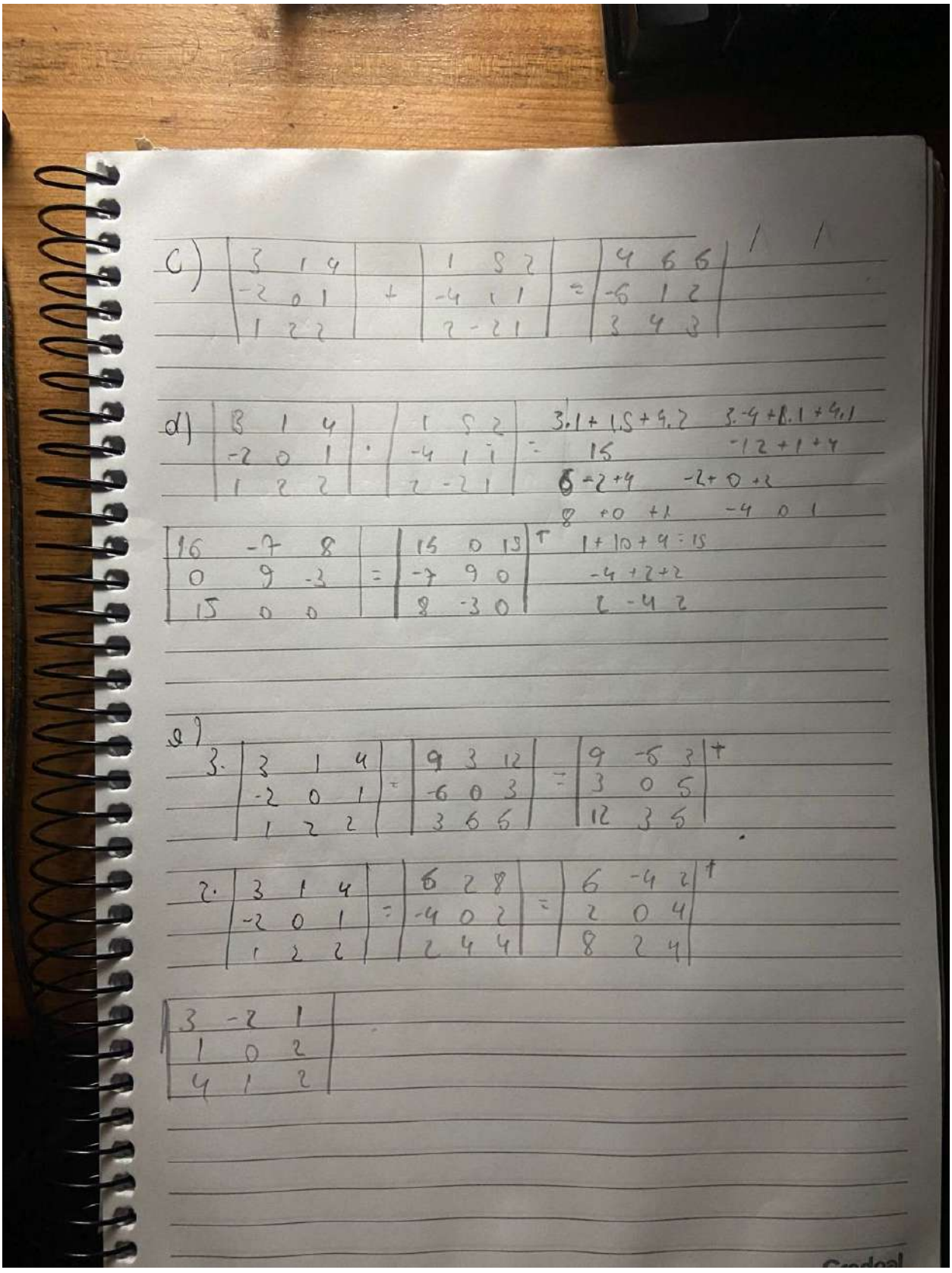
a) forma linha degrau
b) nenhuma
c) forma linha degrau
d) forma linha degrau
e) nenhuma
f) nenhuma
g) forma linha degrau
h) forma linha degrau

4) Sejam A e B

a) $\frac{1}{2} \cdot \begin{bmatrix} 3 & 1 & 4 \\ -2 & 0 & 1 \\ 1 & 2 & 2 \end{bmatrix} = \begin{bmatrix} 3/2 & 1/2 & 2 \\ -1 & 0 & 1/2 \\ 1/2 & 1 & 1 \end{bmatrix}$

b) $3 \cdot \begin{bmatrix} 3 & 1 & 4 \\ -2 & 0 & 1 \\ 1 & 2 & 2 \end{bmatrix} = \begin{bmatrix} 9 & 3 & 12 \\ -6 & 0 & 3 \\ 3 & 6 & 6 \end{bmatrix}$ $2 \cdot \begin{bmatrix} 1 & 5 & 2 \\ -4 & 1 & 1 \\ 2 & -2 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 10 & 2 \\ -8 & 2 & 2 \\ 4 & -4 & 4 \end{bmatrix}$

$\begin{bmatrix} 7 & -7 & 10 \\ -14 & -2 & -1 \\ -1 & 10 & 2 \end{bmatrix}$



c) $\begin{vmatrix} 3 & 1 & 4 \\ -2 & 0 & 1 \\ 1 & 2 & 2 \end{vmatrix} + \begin{vmatrix} 1 & 5 & 2 \\ -4 & 1 & 1 \\ 2 & -2 & 1 \end{vmatrix} = \begin{vmatrix} 4 & 6 & 6 \\ -6 & 1 & 2 \\ 3 & 4 & 3 \end{vmatrix}$ 1 1

d) $\begin{vmatrix} 3 & 1 & 4 \\ -2 & 0 & 1 \\ 1 & 2 & 2 \end{vmatrix} \cdot \begin{vmatrix} 1 & 5 & 2 \\ -4 & 1 & 1 \\ 2 & -2 & 1 \end{vmatrix} = \begin{vmatrix} 3.1+1.5+4.2 & 3.4+1.1+4.1 & \\ 15 & -12+1+4 & \\ 6-2+4 & -2+0+2 & \\ 8+0+1 & -4+0+1 & \end{vmatrix}$

$\begin{vmatrix} 16 & -7 & 8 \\ 0 & 9 & -3 \\ 15 & 0 & 0 \end{vmatrix} = \begin{vmatrix} 15 & 0 & 15 \\ -7 & 9 & 0 \\ 8 & -3 & 0 \end{vmatrix}^T$ $1+10+4=15$, $-4+2+2$, $2-4+2$

e)

3. $\begin{vmatrix} 3 & 1 & 4 \\ -2 & 0 & 1 \\ 1 & 2 & 2 \end{vmatrix} = \begin{vmatrix} 9 & 3 & 12 \\ -6 & 0 & 3 \\ 3 & 6 & 6 \end{vmatrix} = \begin{vmatrix} 9 & -6 & 3 \\ 3 & 0 & 5 \\ 12 & 3 & 6 \end{vmatrix}^t$

2. $\begin{vmatrix} 3 & 1 & 4 \\ -2 & 0 & 1 \\ 1 & 2 & 2 \end{vmatrix} = \begin{vmatrix} 6 & 2 & 8 \\ -4 & 0 & 2 \\ 2 & 4 & 4 \end{vmatrix} = \begin{vmatrix} 6 & -4 & 2 \\ 2 & 0 & 4 \\ 8 & 2 & 4 \end{vmatrix}^t$

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