

**DISCIPLINA:** MTM224 – Métodos Numéricos Computacionais

**CURSO:** Ciências da Computação - Bacharelado

**HORAS/AULA:** 60 hrs

**ANO/PERÍODO:** 2024/02

**TURMA:** 15/307

**PROFESSOR:** Paulo F. C. Tilles

## ATIVIDADE AVALIATIVA 02 SISTEMAS LINEARES

### QUESTÃO 01

Resolva o sistema de equações lineares  $Ax = b$  utilizando os seguintes métodos:

- Eliminação gaussiana com retrossubstituição e estratégia de pivotamento parcial (valor 2.5).
- Eliminação gaussiana com retrossubstituição e estratégia de pivotamento total (valor 2.5).

Os sistemas lineares definidos para cada aluno estão distribuídos na **TABELA I**.

### QUESTÃO 02

Resolva o sistema de equações lineares  $Cx = d$  utilizando os seguintes métodos iterativos:

- Método de Jacobi (valor 2.5).
- Método de Gauss-Seidel (valor 2.5).

A solução numérica deve apresentar erro relativo individual (i.e., para cada componente) menor que  $10^{-5}$ .

Os sistemas lineares definidos para cada aluno estão distribuídos na **TABELA II**.

### DIRETRIZES

- As soluções numéricas obtidas deverão ser apresentadas na forma de tabelas, sendo que cada método exigirá uma tabela específica contendo informações de cada iteração, conforme realizado na apresentação do módulo (vide exemplo de solução).
- Os valores apresentados nas tabelas devem ser dispostos com 10 dígitos significativos.
- A solução deve ser enviada por email na forma de um único arquivo no formato pdf, com páginas ordenadas e numeradas. Cada aluno deve nomear o seu arquivo conforme descrito na **TABELA III**.
- Caso a solução apresentada não esteja em conformidade com alguma destas diretrizes a nota será nula.

### INFORMAÇÕES EXIGIDAS EM CADA MÉTODO

#### Eliminação gaussiana

A resolução deve conter as matrizes aumentadas obtidas a cada etapa do processo de eliminação e o vetor solução.

#### Métodos iterativos

A resolução deve ser constituída por duas tabelas descrevendo o comportamento das variáveis em cada ordem de iteração  $k$ : a primeira contendo as estimativas  $x_n^{(k)}$  das componentes e a segunda contendo os erros relativos  $ER_n^{(k)}$  de cada componente.

TABELA I | PARTE 01/03

ALAN BESSAUER LENCINA

$$A = \begin{pmatrix} 47 & -61 & 61 & -85 & -2 & 52 & 29 \\ 57 & 67 & 38 & 74 & -11 & 4 & 24 \\ 45 & -27 & 62 & 11 & -87 & 35 & -8 \\ -45 & -77 & -67 & 63 & -32 & -61 & -66 \\ -81 & -14 & -33 & 48 & 39 & 86 & 7 \\ 98 & -21 & 94 & -35 & 19 & -36 & 49 \\ -44 & 18 & 47 & 65 & -61 & -86 & 23 \end{pmatrix}$$

$$b = \begin{pmatrix} -99 \\ 95 \\ 27 \\ 50 \\ -77 \\ 63 \\ 37 \end{pmatrix}$$

ALEXANDRE CHAGAS BRITES

$$A = \begin{pmatrix} -8 & 62 & 17 & 47 & 4 & 43 & 74 \\ -28 & -40 & -77 & 42 & -98 & -28 & 6 \\ 81 & 38 & 39 & 78 & -71 & -33 & -8 \\ 55 & -19 & -29 & 96 & 90 & -97 & 97 \\ -51 & 80 & -69 & -45 & 87 & -91 & 14 \\ -30 & -15 & -32 & 15 & -23 & -25 & -58 \\ -20 & -79 & 42 & -12 & 35 & 31 & -53 \end{pmatrix}$$

$$b = \begin{pmatrix} -3 \\ -56 \\ -64 \\ -68 \\ 68 \\ -24 \\ -44 \end{pmatrix}$$

ANA LILIAN ALFONSO TOLEDO

$$A = \begin{pmatrix} -92 & 95 & 56 & 94 & 45 & -46 & 37 \\ 38 & -27 & 28 & 37 & 42 & 12 & -80 \\ 47 & 45 & 24 & 84 & 73 & 52 & 73 \\ 80 & 39 & 39 & 62 & -87 & -83 & 58 \\ 37 & 77 & -39 & -35 & -78 & 31 & -1 \\ -22 & -99 & 12 & 39 & 52 & 73 & -34 \\ -47 & -99 & -1 & 7 & -4 & 83 & -4 \end{pmatrix}$$

$$b = \begin{pmatrix} 46 \\ -14 \\ -42 \\ -8 \\ -92 \\ -30 \\ -55 \end{pmatrix}$$

ANDERSON DALMOLIN CATTELAN

$$A = \begin{pmatrix} -21 & 61 & 96 & -11 & 62 & 58 & 21 \\ 31 & -84 & 79 & -71 & -63 & -49 & -45 \\ 33 & -54 & 37 & 75 & -16 & 68 & 57 \\ 71 & 58 & -76 & 44 & -84 & 39 & -24 \\ -57 & -11 & 43 & 41 & 67 & -18 & -51 \\ 12 & -35 & 11 & 69 & -28 & -67 & -98 \\ 8 & 10 & -1 & -75 & 13 & -99 & -32 \end{pmatrix}$$

$$b = \begin{pmatrix} 55 \\ 60 \\ 21 \\ 70 \\ -19 \\ 6 \\ -83 \end{pmatrix}$$

ARTHUR BOGACKI VERISSIMO

$$A = \begin{pmatrix} 54 & 43 & -98 & 82 & 82 & 35 & 47 \\ 62 & -1 & -32 & -4 & 75 & 98 & -51 \\ -40 & -22 & 41 & -1 & -52 & 1 & -36 \\ 15 & -21 & 92 & 85 & 16 & 8 & 19 \\ 7 & -12 & 94 & 64 & -14 & -100 & 38 \\ 31 & -32 & 77 & 0 & 81 & 40 & 56 \\ 66 & -19 & 0 & -15 & -24 & 20 & 45 \end{pmatrix}$$

$$b = \begin{pmatrix} -49 \\ -73 \\ -47 \\ 86 \\ -43 \\ 66 \\ -3 \end{pmatrix}$$

BIANCA SABRINA BUBLITZ

$$A = \begin{pmatrix} 98 & 73 & -15 & -17 & 1 & 21 & -74 \\ 73 & -75 & -30 & -85 & 3 & -9 & 91 \\ -42 & 38 & 71 & -48 & -3 & 60 & -91 \\ -59 & 72 & 72 & 82 & -98 & 3 & -6 \\ 9 & 51 & 33 & -24 & 59 & -57 & 11 \\ -63 & 70 & -98 & -76 & -52 & -59 & 11 \\ -38 & 47 & -100 & 5 & -80 & -46 & -8 \end{pmatrix}$$

$$b = \begin{pmatrix} 22 \\ -30 \\ 82 \\ 97 \\ 11 \\ 82 \\ 36 \end{pmatrix}$$

BRUNO DOS SANTOS UMPIERRE

$$A = \begin{pmatrix} 87 & 43 & -65 & 34 & 42 & -93 & -98 \\ 33 & -62 & 84 & 43 & 58 & 73 & 73 \\ -39 & 29 & 59 & 95 & -78 & 100 & 26 \\ 88 & -88 & 49 & 0 & -55 & -45 & -50 \\ -41 & -41 & 55 & 18 & -88 & 34 & 41 \\ -61 & -22 & -28 & -14 & -37 & 47 & 66 \\ 32 & -44 & 33 & -79 & 50 & 56 & 7 \end{pmatrix}$$

$$b = \begin{pmatrix} -45 \\ 57 \\ 5 \\ 40 \\ 100 \\ -81 \\ 27 \end{pmatrix}$$

BRUNO PERUSSATTO

$$A = \begin{pmatrix} -20 & -34 & 33 & -5 & 3 & -56 & 6 \\ -72 & -7 & 42 & -33 & 15 & 46 & -30 \\ 63 & -94 & 66 & 30 & -93 & -38 & -87 \\ -10 & -15 & 62 & -98 & 16 & 74 & -10 \\ -2 & -6 & 22 & -20 & 77 & 4 & -95 \\ 31 & 18 & 60 & -81 & -100 & -4 & 8 \\ 32 & -72 & 55 & 53 & -29 & -77 & -93 \end{pmatrix}$$

$$b = \begin{pmatrix} 77 \\ -56 \\ -2 \\ 47 \\ 16 \\ -38 \\ -44 \end{pmatrix}$$

CARLOS EDUARDO VELOZO CORREA

$$A = \begin{pmatrix} -66 & 64 & -60 & -60 & -36 & 5 & -51 \\ 21 & 93 & -84 & 15 & 54 & -52 & 21 \\ 37 & -67 & -90 & 35 & 19 & 59 & -35 \\ -4 & -33 & -31 & -73 & 54 & 18 & -12 \\ -20 & -10 & 100 & -33 & -5 & 50 & 76 \\ 15 & 84 & 12 & -13 & -22 & -47 & -89 \\ -15 & 9 & -43 & -66 & 61 & -39 & -8 \end{pmatrix}$$

$$b = \begin{pmatrix} -14 \\ -20 \\ -14 \\ -78 \\ 9 \\ 18 \\ 72 \end{pmatrix}$$

CELSO MAIA DA SILVA NETO

$$A = \begin{pmatrix} 54 & 54 & 89 & 35 & -10 & -54 & -57 \\ 76 & 16 & 46 & -48 & -46 & 71 & -78 \\ 27 & -18 & 94 & -38 & 88 & 89 & -86 \\ 69 & 83 & -45 & 81 & 57 & 13 & -58 \\ -59 & -78 & 91 & 92 & -58 & 58 & -79 \\ 33 & -72 & 45 & 68 & 35 & -27 & -88 \\ -40 & -32 & 32 & 84 & -63 & -50 & 35 \end{pmatrix}$$

$$b = \begin{pmatrix} 78 \\ -44 \\ 21 \\ -54 \\ 28 \\ -92 \\ -11 \end{pmatrix}$$

DAVI DE CASTRO MACHADO

$$A = \begin{pmatrix} -81 & 97 & -70 & -9 & 36 & -55 & 54 \\ -23 & -76 & 22 & -17 & 85 & -28 & -37 \\ 70 & -67 & 54 & 23 & -37 & 30 & -96 \\ 65 & -36 & -42 & -83 & 98 & 29 & -77 \\ -17 & -22 & 8 & -20 & -69 & 78 & -64 \\ 99 & 64 & -79 & 13 & 33 & 13 & 6 \\ 82 & 76 & -26 & -29 & -1 & 71 & 9 \end{pmatrix}$$

$$b = \begin{pmatrix} -39 \\ 81 \\ 95 \\ -66 \\ -82 \\ -76 \\ 95 \end{pmatrix}$$

DIEGO RIBEIRO CHAVES

$$A = \begin{pmatrix} 48 & 44 & 10 & -68 & -35 & -58 & -72 \\ -47 & 42 & 97 & 93 & 75 & 27 & -28 \\ 72 & -60 & 47 & 56 & -22 & -38 & 66 \\ -94 & 77 & -80 & 1 & -40 & 77 & -10 \\ 93 & -61 & -66 & 42 & 65 & -41 & -28 \\ 10 & 78 & -72 & 59 & -82 & -11 & -57 \\ 9 & 31 & 96 & -61 & 11 & 46 & -90 \end{pmatrix}$$

$$b = \begin{pmatrix} -99 \\ 28 \\ -76 \\ 100 \\ -60 \\ -10 \\ 35 \end{pmatrix}$$

DOUGLAS MAGALHAES SILVA

$$A = \begin{pmatrix} -86 & 51 & 82 & 63 & 5 & -82 & 37 \\ 58 & -83 & -50 & -78 & -88 & -12 & 94 \\ 91 & 79 & -42 & 37 & -95 & -62 & -11 \\ 23 & 38 & -47 & -23 & 50 & 69 & -100 \\ 33 & 46 & 45 & -48 & -38 & -66 & -75 \\ -65 & -22 & -77 & 98 & -62 & 66 & 47 \\ 28 & 33 & -41 & -31 & -48 & -16 & 75 \end{pmatrix}$$

$$b = \begin{pmatrix} -60 \\ 97 \\ 92 \\ -93 \\ -16 \\ -85 \\ 86 \end{pmatrix}$$

ENZO HAHN VERONEZE

$$A = \begin{pmatrix} 48 & -51 & 11 & -40 & 79 & -68 & -20 \\ -89 & 72 & 75 & 95 & 85 & 11 & -40 \\ 89 & 76 & -96 & 3 & 64 & 63 & -38 \\ 89 & 84 & -70 & 60 & 21 & -44 & 21 \\ -98 & 55 & 71 & -100 & 12 & -79 & -73 \\ 6 & 83 & -78 & 65 & -62 & -48 & -16 \\ 45 & 71 & 84 & -73 & 25 & 63 & -4 \end{pmatrix}$$

$$b = \begin{pmatrix} -43 \\ -93 \\ 95 \\ -27 \\ 89 \\ 16 \\ 59 \end{pmatrix}$$

FERNANDO KALIKOSQUE LAYDNER JUNIOR

$$A = \begin{pmatrix} 70 & -94 & 98 & 44 & 76 & 61 & 64 \\ 82 & -56 & -9 & -79 & -81 & 14 & -58 \\ 96 & -75 & 10 & 94 & 69 & 49 & -15 \\ -35 & -15 & 45 & -25 & -11 & -89 & -9 \\ 90 & -64 & -47 & 77 & -1 & -37 & -55 \\ -97 & 4 & 76 & 28 & 84 & -52 & -42 \\ 32 & -56 & -40 & 12 & -46 & -8 & -90 \end{pmatrix}$$

$$b = \begin{pmatrix} 33 \\ 65 \\ -41 \\ 53 \\ 65 \\ -13 \\ 33 \end{pmatrix}$$

FERNANDO MARINO MELCHIOR

$$A = \begin{pmatrix} 87 & 93 & 15 & -7 & -99 & 59 & 70 \\ 64 & -55 & 39 & -28 & 93 & -88 & 56 \\ -31 & 0 & -18 & 73 & 91 & -70 & -82 \\ 64 & 95 & -89 & 72 & 1 & -67 & 70 \\ 1 & 63 & -31 & 10 & -94 & 40 & 89 \\ 36 & -29 & 84 & -6 & -56 & -72 & -39 \\ 79 & 48 & -92 & 5 & -83 & -62 & -47 \end{pmatrix}$$

$$b = \begin{pmatrix} 64 \\ 13 \\ -57 \\ -66 \\ -89 \\ -21 \\ 43 \end{pmatrix}$$

**TABELA I | PARTE 02/03**

**GABRIEL ATARAO DENARDI**

$$A = \begin{pmatrix} -76 & 50 & -65 & -3 & 61 & 94 & 17 \\ -78 & 98 & 42 & -21 & 29 & 25 & 67 \\ 52 & 43 & -89 & 1 & -88 & -58 & 77 \\ 38 & 18 & -76 & 92 & -36 & -69 & 35 \\ -56 & 34 & 71 & 79 & -47 & 61 & 65 \\ -79 & 20 & 41 & -47 & 0 & -92 & 76 \\ -9 & 73 & -69 & -31 & 56 & -99 & -36 \end{pmatrix}$$

$$b = \begin{pmatrix} -39 \\ -90 \\ 89 \\ 8 \\ -73 \\ -42 \\ -22 \end{pmatrix}$$

**GABRIEL DA SILVA FRANCA**

$$A = \begin{pmatrix} -18 & 16 & -57 & 7 & -11 & 77 & 83 \\ 43 & -58 & -74 & -78 & 17 & 100 & 52 \\ -93 & -58 & -21 & 95 & 84 & -70 & -84 \\ -30 & -5 & 26 & -54 & -66 & -69 & -25 \\ -69 & 1 & 73 & 94 & -52 & 38 & -53 \\ -82 & 67 & 86 & -33 & -64 & 51 & -13 \\ 59 & 9 & -45 & 85 & -85 & 96 & 79 \end{pmatrix}$$

$$b = \begin{pmatrix} 78 \\ -8 \\ -99 \\ -64 \\ 56 \\ -34 \\ 50 \end{pmatrix}$$

**GABRIEL PORTO DE FREITAS**

$$A = \begin{pmatrix} -32 & 28 & -29 & -77 & 75 & 87 & -33 \\ -25 & -79 & 71 & -54 & 100 & -58 & -43 \\ -59 & 12 & 51 & 75 & -38 & -43 & -33 \\ -59 & -85 & 41 & -31 & 51 & 94 & 31 \\ -68 & -84 & 86 & 86 & -68 & 12 & 98 \\ -14 & 6 & -31 & 39 & -57 & 99 & 43 \\ 1 & 0 & -52 & -65 & -35 & -88 & -63 \end{pmatrix}$$

$$b = \begin{pmatrix} -62 \\ 18 \\ 13 \\ 27 \\ -22 \\ -71 \\ -82 \end{pmatrix}$$

**GABRIEL SOUZA BAGGIO**

$$A = \begin{pmatrix} 95 & 98 & 28 & 69 & 8 & -69 & -37 \\ 82 & -41 & -56 & -79 & 25 & -66 & -6 \\ -24 & 81 & -60 & -23 & -38 & 70 & -43 \\ 49 & 30 & -8 & 6 & 0 & -81 & -91 \\ 73 & -55 & -80 & 70 & -81 & -68 & 77 \\ 41 & -8 & -39 & 92 & 79 & -18 & -54 \\ 58 & -13 & 50 & 33 & 32 & -52 & 62 \end{pmatrix}$$

$$b = \begin{pmatrix} 63 \\ 6 \\ 9 \\ 58 \\ -78 \\ -79 \\ -77 \end{pmatrix}$$

**GABRIEL STIEGEMEIER**

$$A = \begin{pmatrix} 37 & 19 & -78 & -68 & -31 & -91 & -83 \\ -68 & 48 & 76 & -36 & 80 & -18 & 43 \\ -41 & -89 & -84 & -92 & -69 & -1 & -86 \\ -58 & 47 & -43 & 54 & 64 & 0 & -74 \\ -12 & 8 & 13 & -39 & 25 & -62 & -67 \\ 41 & -47 & 78 & -19 & -14 & 73 & -24 \\ -47 & 54 & -87 & -34 & -48 & 10 & -67 \end{pmatrix}$$

$$b = \begin{pmatrix} -69 \\ 8 \\ -45 \\ -62 \\ -94 \\ -40 \\ 63 \end{pmatrix}$$

**GUILHERME BRIZZI**

$$A = \begin{pmatrix} 14 & -26 & -6 & -33 & 4 & -69 & 45 \\ -21 & -2 & -14 & 47 & 66 & 97 & 91 \\ -64 & 27 & -55 & -73 & -72 & -32 & 75 \\ 22 & -96 & 70 & 85 & 36 & -37 & -84 \\ -89 & 84 & -10 & 46 & 6 & -67 & 44 \\ -30 & 76 & 81 & -67 & 29 & -52 & 34 \\ 19 & -51 & 17 & -78 & -30 & -100 & 59 \end{pmatrix}$$

$$b = \begin{pmatrix} -74 \\ 68 \\ -97 \\ 90 \\ 12 \\ -26 \\ 6 \end{pmatrix}$$

**GUILHERME MENEGHETTI EINLOFT**

$$A = \begin{pmatrix} -8 & 21 & -19 & -94 & 29 & -44 & -78 \\ 1 & -79 & -35 & -87 & 47 & 67 & -19 \\ -41 & 81 & -82 & 68 & 90 & -34 & -16 \\ -30 & -18 & -31 & 86 & 72 & 33 & 76 \\ -86 & 90 & -95 & 15 & 14 & 68 & -14 \\ 82 & -72 & -75 & 37 & -80 & 43 & 90 \\ 24 & -58 & -85 & 43 & 60 & -48 & -43 \end{pmatrix}$$

$$b = \begin{pmatrix} 8 \\ 37 \\ 45 \\ -42 \\ 72 \\ 44 \\ 37 \end{pmatrix}$$

**IGOR GUIMARAES**

$$A = \begin{pmatrix} 95 & -67 & 46 & -21 & 21 & -73 & -39 \\ -60 & -84 & 83 & -86 & -60 & -61 & -12 \\ -42 & 69 & 3 & 58 & -14 & -24 & 4 \\ 53 & 92 & 70 & -93 & 57 & 43 & 45 \\ 46 & 14 & 0 & -31 & 37 & -76 & -15 \\ 53 & 33 & -24 & -96 & -57 & -78 & -19 \\ -91 & 68 & -1 & -25 & 28 & -96 & 22 \end{pmatrix}$$

$$b = \begin{pmatrix} 97 \\ -52 \\ -42 \\ 71 \\ 6 \\ -67 \\ -18 \end{pmatrix}$$

**JAIME ANTONIO DANIEL FILHO**

$$A = \begin{pmatrix} -99 & -66 & 100 & -58 & -86 & 43 & -83 \\ 64 & 38 & -4 & 61 & -31 & -88 & 62 \\ 59 & -9 & -25 & 79 & -95 & -6 & -35 \\ 76 & 16 & -61 & 42 & -72 & 0 & -85 \\ -47 & 54 & 9 & 64 & 84 & -51 & 84 \\ 93 & 16 & -79 & 85 & 28 & 81 & 12 \\ 92 & 43 & 18 & 55 & 23 & 0 & 89 \end{pmatrix}$$

$$b = \begin{pmatrix} 5 \\ 39 \\ -46 \\ -40 \\ 63 \\ 91 \\ 56 \end{pmatrix}$$

**JOAO PEDRO AZENHA RIGHI**

$$A = \begin{pmatrix} 40 & -77 & -91 & -20 & 85 & 17 & -90 \\ -78 & -97 & 40 & 83 & 5 & 67 & 33 \\ -91 & -4 & 15 & -92 & -44 & -74 & -50 \\ 54 & -53 & 71 & 69 & -87 & 22 & -9 \\ 63 & -31 & -12 & 19 & -41 & -84 & -24 \\ -13 & 39 & -26 & 42 & 72 & 11 & -65 \\ 42 & 79 & 49 & -91 & -79 & 29 & -23 \end{pmatrix}$$

$$b = \begin{pmatrix} 16 \\ -80 \\ 66 \\ 46 \\ 58 \\ -84 \\ 31 \end{pmatrix}$$

**JOAO PEDRO DA SILVA MARQUES**

$$A = \begin{pmatrix} -97 & 18 & -14 & -67 & -87 & -54 & 33 \\ -96 & 32 & -29 & 64 & -87 & 28 & -55 \\ 10 & -45 & 23 & 92 & 95 & 0 & 40 \\ -45 & 41 & -26 & 89 & -4 & -89 & -61 \\ 93 & 90 & 6 & 46 & -56 & -30 & -80 \\ -60 & -8 & -74 & -42 & 86 & -70 & -73 \\ -20 & -92 & -70 & 13 & 22 & 52 & 21 \end{pmatrix}$$

$$b = \begin{pmatrix} -95 \\ 78 \\ 23 \\ 19 \\ -45 \\ -58 \\ -16 \end{pmatrix}$$

**JOAO VITOR DA SILVA**

$$A = \begin{pmatrix} -65 & 31 & -99 & -46 & -59 & 82 & -44 \\ 49 & 81 & -79 & -82 & -1 & -23 & 18 \\ -26 & 27 & 100 & 90 & -26 & -63 & -51 \\ -38 & -1 & -7 & 93 & -8 & 22 & -52 \\ 24 & 80 & 66 & 54 & -91 & 55 & 81 \\ -90 & -44 & -79 & 91 & -52 & -42 & 34 \\ -2 & -56 & -80 & 80 & -42 & 11 & -54 \end{pmatrix}$$

$$b = \begin{pmatrix} 18 \\ -93 \\ 55 \\ 13 \\ -74 \\ 86 \\ 75 \end{pmatrix}$$

**LARISSA RODRIGUES SILVEIRA**

$$A = \begin{pmatrix} -11 & 40 & -77 & -3 & -93 & 87 & -4 \\ -82 & 5 & -14 & -44 & -38 & 78 & -87 \\ 72 & 14 & -20 & -77 & -6 & -81 & 63 \\ 8 & 76 & 48 & -38 & -82 & 75 & 25 \\ -63 & -39 & 33 & -66 & -18 & 89 & 19 \\ -10 & 82 & -86 & 57 & -20 & -20 & 38 \\ 45 & 33 & -99 & 75 & 79 & -57 & 76 \end{pmatrix}$$

$$b = \begin{pmatrix} -23 \\ 41 \\ 66 \\ 89 \\ -18 \\ -32 \\ 81 \end{pmatrix}$$

**LEANDRO BRUM DA SILVA LACORTE**

$$A = \begin{pmatrix} 19 & 48 & -48 & 49 & 67 & 33 & -82 \\ 58 & 78 & 21 & -100 & 70 & 31 & 75 \\ -32 & 5 & -59 & -61 & 90 & 46 & -37 \\ 88 & 74 & -18 & -99 & -48 & -83 & -62 \\ 89 & 76 & -27 & 94 & 16 & 91 & 39 \\ 96 & 12 & 14 & -28 & 93 & -27 & -3 \\ -83 & 38 & -29 & -98 & 51 & -45 & 3 \end{pmatrix}$$

$$b = \begin{pmatrix} -42 \\ -46 \\ -58 \\ 30 \\ -36 \\ 82 \\ -97 \end{pmatrix}$$

**LEANDRO OLIVEIRA GALBARINO DO NASCIMENTO**

$$A = \begin{pmatrix} 83 & 61 & -6 & -55 & 9 & -35 & -61 \\ -24 & 87 & -5 & -38 & 19 & 53 & 26 \\ -28 & -97 & -13 & -66 & 70 & -5 & 52 \\ 69 & -9 & -82 & -100 & 58 & -52 & 55 \\ 79 & 42 & -81 & 62 & -81 & 6 & -16 \\ -5 & 98 & -10 & 67 & 95 & -9 & -1 \\ 59 & 63 & -56 & -90 & 0 & -29 & -64 \end{pmatrix}$$

$$b = \begin{pmatrix} -70 \\ 73 \\ -51 \\ -32 \\ -68 \\ -29 \\ 2 \end{pmatrix}$$

**LUCAS XAVIER PAIRE**

$$A = \begin{pmatrix} -8 & 15 & -12 & 89 & -42 & -44 & 38 \\ -93 & -31 & -41 & 43 & -52 & -50 & -79 \\ -92 & 53 & 1 & -75 & 17 & -78 & 6 \\ 83 & -17 & 94 & -98 & -55 & 30 & 61 \\ -13 & -73 & -41 & 32 & 74 & -75 & -64 \\ -88 & -100 & -91 & 77 & 97 & -9 & -38 \\ -1 & -97 & 99 & 2 & -86 & 29 & 74 \end{pmatrix}$$

$$b = \begin{pmatrix} 90 \\ 76 \\ 31 \\ 15 \\ -49 \\ -81 \\ -57 \end{pmatrix}$$

**TABELA I | PARTE 03/03**

**LUIS FERNANDO DA CRUZ ANTUNES**

$$A = \begin{pmatrix} 54 & 92 & -31 & -3 & -2 & 75 & 88 \\ 89 & 100 & 26 & -40 & 45 & 43 & 55 \\ -77 & 44 & -24 & 52 & -7 & 89 & -41 \\ -25 & -79 & -26 & -5 & 56 & -9 & 1 \\ -50 & 64 & 81 & -51 & 95 & 89 & 67 \\ 37 & 71 & 69 & -15 & 46 & 65 & 5 \\ 57 & 83 & 78 & -14 & -52 & -86 & -37 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} -51 \\ 17 \\ 24 \\ -82 \\ -49 \\ 28 \\ 2 \end{pmatrix}$$

**LUIS GUSTAVO WERLE TOZEVICH**

$$A = \begin{pmatrix} -46 & 15 & -88 & 16 & -66 & -14 & 74 \\ -48 & 43 & -100 & 21 & 48 & -60 & -86 \\ -60 & 77 & -34 & -32 & 17 & 8 & -69 \\ 72 & -50 & 43 & -92 & 10 & 24 & -33 \\ 76 & -11 & -73 & 31 & -46 & 66 & 90 \\ 52 & 43 & 14 & 22 & -99 & -12 & 12 \\ -30 & -57 & -23 & 46 & -18 & 4 & 70 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 20 \\ 64 \\ -35 \\ 87 \\ 9 \\ -58 \\ -39 \end{pmatrix}$$

**LUIS HENRIQUE SILVEIRA POZZEBON**

$$A = \begin{pmatrix} 2 & -26 & 36 & -26 & 70 & 24 & -66 \\ -69 & -55 & -55 & 93 & 32 & -86 & -22 \\ -47 & 91 & -33 & -17 & 94 & -83 & 76 \\ 25 & 3 & 40 & -20 & 4 & 83 & -10 \\ -92 & -46 & -84 & 76 & -20 & -34 & 33 \\ 35 & 86 & -10 & -81 & -3 & 40 & -41 \\ -2 & -61 & 69 & 41 & -23 & 56 & 6 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 21 \\ 53 \\ -49 \\ -45 \\ -89 \\ -29 \\ -95 \end{pmatrix}$$

**MATHIAS ECKERT RECKTENVALD**

$$A = \begin{pmatrix} -41 & 86 & 75 & 17 & -100 & -95 & -20 \\ 37 & -14 & -52 & 1 & -20 & 72 & -53 \\ 9 & -93 & 29 & -51 & 97 & 64 & 43 \\ -70 & 14 & -3 & 85 & 0 & 82 & 54 \\ -32 & 68 & -24 & -88 & 91 & 23 & -31 \\ 31 & -83 & -64 & -64 & 36 & -39 & -34 \\ 16 & 7 & 90 & -45 & -96 & -14 & 21 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 89 \\ -77 \\ -50 \\ 39 \\ -26 \\ 73 \\ 7 \end{pmatrix}$$

**MIGUEL BRONDANI**

$$A = \begin{pmatrix} -9 & -33 & -2 & 68 & 79 & 93 & 46 \\ 70 & -78 & 93 & -24 & -54 & -29 & -65 \\ -54 & -79 & 76 & -76 & -34 & -82 & 28 \\ 18 & -94 & -86 & 67 & -87 & 89 & 60 \\ -39 & 25 & 100 & 69 & 47 & -52 & -31 \\ -17 & -14 & -72 & -42 & -28 & -60 & 46 \\ 91 & -9 & 28 & -7 & -12 & -46 & -55 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 21 \\ 14 \\ -78 \\ 98 \\ -1 \\ -21 \\ 78 \end{pmatrix}$$

**MIGUEL MIRON SILVA**

$$A = \begin{pmatrix} -75 & 56 & -86 & 59 & 38 & -2 & -68 \\ 58 & 82 & -11 & 74 & 27 & 80 & -23 \\ -26 & 96 & 57 & 15 & -92 & -15 & -14 \\ 45 & 99 & 21 & -48 & 30 & -25 & -13 \\ 62 & 93 & 40 & -97 & 77 & -63 & 48 \\ -68 & -83 & 49 & -17 & 42 & 67 & 50 \\ 27 & -30 & -73 & -1 & 51 & 78 & -19 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 83 \\ -32 \\ -79 \\ -73 \\ 23 \\ -46 \\ -70 \end{pmatrix}$$

**PEDRO DE ANDRADE SANTOS**

$$A = \begin{pmatrix} 3 & -41 & 2 & -43 & 70 & -6 & -8 \\ 98 & -8 & 12 & 11 & -74 & 5 & -74 \\ 54 & 1 & 9 & -35 & 96 & 48 & -15 \\ 35 & 65 & -75 & -34 & -4 & 87 & 72 \\ -45 & 41 & 64 & -31 & 85 & -77 & -26 \\ -55 & 37 & -64 & -59 & -8 & 51 & 7 \\ -88 & 45 & 26 & 28 & 18 & 46 & 56 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} -3 \\ 28 \\ -28 \\ 57 \\ 12 \\ 35 \\ 33 \end{pmatrix}$$

**RAFAELA DA ROSA SOARES**

$$A = \begin{pmatrix} 28 & 9 & 0 & -70 & 34 & 83 & 48 \\ -76 & 99 & 92 & 86 & -31 & 94 & -67 \\ 11 & -10 & 49 & 86 & -27 & 27 & -30 \\ -23 & 96 & 13 & 62 & -96 & 13 & 95 \\ -28 & -24 & -67 & 89 & -93 & 95 & -97 \\ -35 & 28 & -66 & 4 & 83 & 87 & 89 \\ -15 & -88 & 58 & -74 & 76 & 72 & -43 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} -83 \\ -86 \\ -13 \\ 98 \\ -18 \\ -45 \\ -14 \end{pmatrix}$$

**TOBIAS VIERO DE OLIVEIRA**

$$A = \begin{pmatrix} 39 & -81 & 55 & 18 & 0 & 0 & 98 \\ 48 & 49 & 87 & -74 & -20 & 8 & 79 \\ 44 & 60 & -8 & 91 & -33 & 49 & 53 \\ 85 & 46 & 84 & 48 & 45 & -91 & -52 \\ 27 & 69 & 98 & 47 & -96 & -11 & -36 \\ -31 & -45 & -100 & 9 & -31 & -66 & -93 \\ -2 & 90 & -59 & 20 & 70 & 18 & -25 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 60 \\ 44 \\ -44 \\ 84 \\ -60 \\ -97 \\ 0 \end{pmatrix}$$

**VIVIANE DILKIN ENDLER**

$$A = \begin{pmatrix} -8 & 9 & -20 & -25 & 90 & 24 & -87 \\ -58 & 9 & -63 & 79 & 95 & 8 & -17 \\ 56 & -46 & -81 & 24 & -51 & 26 & 5 \\ 72 & 12 & 9 & 35 & -57 & -46 & 10 \\ 33 & -76 & 5 & -86 & -19 & 94 & -28 \\ 27 & -74 & -81 & -89 & 73 & -63 & -100 \\ 38 & 52 & 7 & -11 & -38 & 51 & 83 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} -51 \\ 8 \\ -65 \\ 34 \\ -87 \\ 12 \\ -78 \end{pmatrix}$$

**WESLEY LOPES DE OLIVEIRA**

$$A = \begin{pmatrix} -17 & -7 & -57 & 67 & 35 & 36 & -28 \\ -7 & -7 & -44 & 27 & 71 & 78 & 34 \\ 3 & 41 & 72 & 36 & 69 & -88 & -18 \\ 57 & -13 & 5 & -96 & -92 & 44 & 7 \\ -72 & -55 & -13 & 72 & -72 & 53 & -5 \\ -48 & 67 & 81 & 19 & -91 & -44 & 59 \\ -82 & -66 & -67 & 29 & -27 & -43 & 13 \end{pmatrix}$$

$$\mathbf{b} = \begin{pmatrix} 81 \\ 22 \\ 79 \\ 83 \\ -67 \\ -50 \\ -26 \end{pmatrix}$$

**TABELA II | PARTE 01/03**

**ALAN BESSAUER LENCINA**

$$C = \begin{pmatrix} 622 & -107 & 65 & -37 & 17 & -9 & -292 \\ 11 & -640 & 264 & -38 & -50 & 105 & 3 \\ 0 & 42 & 808 & 226 & 156 & 10 & -26 \\ 11 & 69 & -126 & 495 & 3 & 207 & 21 \\ 22 & -71 & -4 & -319 & -627 & 12 & -141 \\ 245 & 7 & -75 & 40 & 87 & -817 & -14 \\ 76 & -126 & 187 & -11 & -30 & 8 & 611 \end{pmatrix}$$

$$d = \begin{pmatrix} 52 \\ 87 \\ 28 \\ -84 \\ -75 \\ -25 \\ -5 \end{pmatrix}$$

**ALEXANDRE CHAGAS BRITES**

$$C = \begin{pmatrix} 533 & 235 & 0 & -73 & -14 & -97 & -23 \\ 5 & -483 & -25 & -117 & -74 & -11 & 191 \\ 195 & -16 & 813 & -4 & 37 & -48 & 137 \\ 9 & 25 & 16 & -549 & -64 & 82 & -242 \\ 39 & -141 & 6 & -77 & -926 & -10 & -202 \\ -16 & 0 & -176 & 87 & -24 & 352 & 46 \\ -76 & -40 & 16 & -284 & 158 & 10 & 972 \end{pmatrix}$$

$$d = \begin{pmatrix} 53 \\ 64 \\ -90 \\ -17 \\ 86 \\ 28 \\ 16 \end{pmatrix}$$

**ANA LILIAN ALFONSO TOLEDO**

$$C = \begin{pmatrix} 472 & 2 & 31 & -97 & 42 & -273 & -16 \\ -3 & 1016 & 135 & 33 & -57 & -272 & -19 \\ -129 & -27 & 836 & 6 & -225 & 64 & 18 \\ 39 & 86 & 5 & -928 & -75 & 12 & 317 \\ -2 & 17 & -138 & 31 & 500 & -71 & -179 \\ 45 & -27 & -201 & -3 & -81 & -728 & 20 \\ 12 & 8 & 47 & -40 & -279 & -115 & -886 \end{pmatrix}$$

$$d = \begin{pmatrix} 96 \\ -37 \\ 94 \\ 98 \\ 53 \\ -81 \\ -35 \end{pmatrix}$$

**ANDERSON DALMOLIN CATTELAN**

$$C = \begin{pmatrix} 881 & -216 & 12 & 1 & -67 & 35 & 113 \\ -76 & 618 & 30 & -114 & 10 & -4 & -262 \\ -219 & -89 & -536 & 27 & 16 & -1 & -52 \\ -7 & -28 & 128 & 592 & -263 & 53 & 16 \\ 33 & -143 & 8 & -49 & 614 & 205 & 19 \\ -59 & 8 & 170 & 100 & -11 & -698 & 28 \\ -259 & 32 & -4 & 14 & 57 & -123 & -825 \end{pmatrix}$$

$$d = \begin{pmatrix} 35 \\ 53 \\ 77 \\ 55 \\ 7 \\ -23 \\ 29 \end{pmatrix}$$

**ARTHUR BOGACKI VERISSIMO**

$$C = \begin{pmatrix} 792 & 13 & 26 & -1 & -117 & 78 & -200 \\ 40 & -598 & 22 & -7 & 297 & 95 & 15 \\ -131 & 172 & 738 & 1 & -15 & -38 & -52 \\ 188 & 58 & -88 & -748 & 18 & -10 & 22 \\ 173 & -3 & -96 & -64 & 614 & 30 & 13 \\ 192 & 137 & -34 & -17 & 42 & 520 & -5 \\ 238 & 40 & -69 & 83 & -6 & 17 & -604 \end{pmatrix}$$

$$d = \begin{pmatrix} 99 \\ 10 \\ 47 \\ 32 \\ 68 \\ 17 \\ -39 \end{pmatrix}$$

**BIANCA SABRINA BUBLITZ**

$$C = \begin{pmatrix} 555 & 208 & -38 & -103 & 60 & 20 & 4 \\ -18 & -861 & 26 & 276 & -62 & -95 & -7 \\ 10 & 34 & 456 & 174 & 40 & 93 & 19 \\ 26 & 143 & -7 & -516 & -43 & -19 & 208 \\ -134 & 7 & -19 & 62 & 812 & 184 & 34 \\ 27 & 10 & 256 & 55 & 14 & 793 & 82 \\ -244 & 28 & 1 & 72 & -91 & -15 & -495 \end{pmatrix}$$

$$d = \begin{pmatrix} -80 \\ 41 \\ 17 \\ 84 \\ 46 \\ 58 \\ -80 \end{pmatrix}$$

**BRUNO DOS SANTOS UMPIERRE**

$$C = \begin{pmatrix} -493 & 51 & 4 & 15 & -95 & 227 & 22 \\ 156 & -827 & -65 & 34 & -190 & 1 & -13 \\ 109 & 37 & -876 & 71 & 6 & -19 & 272 \\ 16 & 63 & -126 & 770 & -199 & -10 & 36 \\ 285 & -27 & 15 & -122 & 919 & -63 & 3 \\ 30 & 0 & -259 & -13 & 78 & -953 & 121 \\ -66 & 39 & -106 & 7 & -15 & -194 & -529 \end{pmatrix}$$

$$d = \begin{pmatrix} 37 \\ -1 \\ 18 \\ 68 \\ -64 \\ -1 \\ -90 \end{pmatrix}$$

**BRUNO PERUSSATTO**

$$C = \begin{pmatrix} 966 & -2 & -291 & -102 & 32 & -11 & 52 \\ 19 & -516 & -21 & 129 & -71 & -3 & -186 \\ -141 & 28 & 829 & -19 & -183 & 44 & -1 \\ 40 & -14 & -73 & 992 & 116 & 254 & 5 \\ -17 & -135 & -296 & -60 & 576 & -7 & -21 \\ 87 & 22 & 9 & -44 & 276 & -890 & -19 \\ 21 & 11 & 9 & 119 & -78 & 196 & 634 \end{pmatrix}$$

$$d = \begin{pmatrix} 43 \\ 48 \\ -43 \\ -51 \\ 54 \\ 45 \\ 94 \end{pmatrix}$$

**CARLOS EDUARDO VELOZO CORREA**

$$C = \begin{pmatrix} -560 & 41 & -155 & 3 & -35 & 20 & 279 \\ 12 & -508 & 92 & 6 & -277 & -50 & 26 \\ 36 & 60 & -853 & -122 & 10 & 5 & 236 \\ 88 & -8 & -19 & 637 & -78 & -306 & -20 \\ 21 & -14 & -272 & 65 & -496 & 5 & -90 \\ -140 & 244 & -53 & 0 & -12 & 517 & 22 \\ 42 & 6 & 18 & 319 & 29 & 124 & 563 \end{pmatrix}$$

$$d = \begin{pmatrix} 59 \\ 4 \\ -59 \\ -11 \\ -71 \\ -50 \\ -18 \end{pmatrix}$$

**CELSO MAIA DA SILVA NETO**

$$C = \begin{pmatrix} -450 & -19 & 21 & -49 & 206 & 3 & 125 \\ 5 & -843 & -16 & 27 & -124 & -257 & -47 \\ -71 & 19 & -583 & -35 & 153 & -10 & 196 \\ 19 & 4 & 52 & 1033 & -274 & -158 & 24 \\ -64 & 237 & 85 & -31 & -466 & -17 & -2 \\ 71 & -1 & 167 & 143 & 17 & 625 & -28 \\ 280 & -72 & -147 & 39 & 17 & 2 & -1040 \end{pmatrix}$$

$$d = \begin{pmatrix} -18 \\ 39 \\ 39 \\ -38 \\ 25 \\ 72 \\ 43 \end{pmatrix}$$

**DAVI DE CASTRO MACHADO**

$$C = \begin{pmatrix} -977 & -69 & 5 & -26 & 141 & -236 & -12 \\ -64 & -626 & 17 & -1 & -21 & 270 & 139 \\ -86 & -10 & 592 & 53 & -235 & 33 & 1 \\ -7 & 47 & 28 & 499 & 167 & -14 & -112 \\ 29 & 258 & -127 & 8 & 565 & -14 & 49 \\ 14 & -6 & -43 & 33 & -266 & 622 & -133 \\ -59 & 14 & 118 & 233 & -24 & -3 & -588 \end{pmatrix}$$

$$d = \begin{pmatrix} 7 \\ 16 \\ 47 \\ -100 \\ -41 \\ -82 \\ -75 \end{pmatrix}$$

**DIEGO RIBEIRO CHAVES**

$$C = \begin{pmatrix} -572 & -93 & -16 & -1 & 288 & 55 & -25 \\ -72 & -1039 & -10 & 4 & -99 & -304 & 38 \\ 20 & 0 & 612 & -113 & -61 & 16 & -316 \\ -220 & 20 & -43 & 824 & 131 & 0 & -20 \\ 5 & 253 & -53 & 148 & -511 & 11 & -29 \\ 86 & -258 & 2 & 20 & 10 & -831 & 63 \\ 31 & 60 & 11 & -122 & 199 & -3 & -455 \end{pmatrix}$$

$$d = \begin{pmatrix} -57 \\ 4 \\ -2 \\ -22 \\ -45 \\ -50 \\ 47 \end{pmatrix}$$

**DOUGLAS MAGALHAES SILVA**

$$C = \begin{pmatrix} -435 & 18 & 0 & -200 & 35 & -101 & -54 \\ 2 & 997 & -18 & 49 & 34 & 247 & 155 \\ 227 & -23 & 835 & -59 & -5 & 146 & -15 \\ 5 & -154 & 209 & 543 & -22 & 12 & 64 \\ -29 & -46 & 3 & 118 & -524 & -172 & 16 \\ -74 & 3 & -124 & -171 & -12 & 504 & -33 \\ -16 & 149 & -3 & 212 & -77 & -39 & -941 \end{pmatrix}$$

$$d = \begin{pmatrix} -31 \\ 19 \\ -88 \\ 2 \\ -69 \\ -11 \\ 11 \end{pmatrix}$$

**ENZO HAHN VERONEZE**

$$C = \begin{pmatrix} 867 & -95 & -9 & 60 & 34 & -235 & 15 \\ 0 & -509 & 243 & 11 & 77 & -29 & 92 \\ 11 & 6 & 597 & -38 & -145 & 40 & 239 \\ 10 & -38 & -53 & -887 & 150 & 3 & -212 \\ 164 & -40 & 43 & -9 & 523 & -110 & 19 \\ 12 & -58 & 175 & 34 & -124 & 555 & -5 \\ -188 & 6 & 59 & 138 & -25 & 17 & -477 \end{pmatrix}$$

$$d = \begin{pmatrix} 1 \\ -58 \\ 54 \\ 55 \\ -28 \\ 30 \\ 98 \end{pmatrix}$$

**FERNANDO KALIKOSQUE LAYDNER JUNIOR**

$$C = \begin{pmatrix} -868 & -36 & -151 & -2 & -14 & 40 & 251 \\ 20 & 975 & -297 & -116 & 59 & -31 & 5 \\ -61 & -35 & -579 & 311 & 3 & 116 & 18 \\ 45 & 37 & 10 & -869 & -114 & 276 & -10 \\ -25 & -16 & -273 & -56 & -615 & -109 & 4 \\ -297 & -51 & 0 & 14 & 120 & 1012 & -33 \\ -319 & -153 & 7 & -39 & -16 & -61 & 1185 \end{pmatrix}$$

$$d = \begin{pmatrix} -21 \\ -48 \\ -28 \\ 33 \\ -51 \\ -47 \\ 81 \end{pmatrix}$$

**FERNANDO MARINO MELCHIOR**

$$C = \begin{pmatrix} 1011 & 78 & -12 & 23 & 267 & 10 & -141 \\ 137 & 572 & -67 & 35 & -8 & -11 & 248 \\ -34 & -75 & 586 & 0 & -300 & -10 & 157 \\ 85 & 14 & 242 & -584 & 9 & 22 & 41 \\ -1 & 193 & 117 & 24 & -395 & -42 & -11 \\ -8 & 68 & 22 & -19 & -309 & -989 & -160 \\ 74 & 11 & 99 & 34 & -5 & 315 & -635 \end{pmatrix}$$

$$d = \begin{pmatrix} -67 \\ -41 \\ 83 \\ 86 \\ -47 \\ 55 \\ 94 \end{pmatrix}$$

**TABELA II | PARTE 02/03**

**GABRIEL ATARAO DENARDI**

$$C = \begin{pmatrix} 506 & -10 & 147 & -40 & -172 & 47 & -12 \\ -25 & 529 & 44 & -88 & 2 & 165 & 20 \\ 49 & -26 & -901 & -20 & -293 & -149 & -7 \\ 9 & 16 & 194 & 473 & -69 & 96 & 35 \\ 280 & 1 & 71 & -142 & -1078 & 34 & -12 \\ -2 & -271 & -116 & 31 & 17 & -509 & -55 \\ -129 & -18 & -256 & 21 & -70 & -1 & 817 \end{pmatrix} \quad d = \begin{pmatrix} -12 \\ 73 \\ -17 \\ -11 \\ 14 \\ 46 \\ 62 \end{pmatrix}$$

**GABRIEL DA SILVA FRANCA**

$$C = \begin{pmatrix} 462 & 11 & -183 & 60 & -125 & 9 & -40 \\ 16 & 921 & -8 & -121 & 20 & -67 & 292 \\ -311 & 32 & -856 & -46 & -80 & 15 & -4 \\ 122 & 13 & -75 & -967 & 313 & 28 & -10 \\ 201 & -69 & 29 & -9 & 818 & 11 & 158 \\ 30 & 61 & -112 & 0 & 294 & -548 & -14 \\ -5 & 13 & 34 & 57 & 94 & -289 & -627 \end{pmatrix} \quad d = \begin{pmatrix} 48 \\ 2 \\ 81 \\ -96 \\ -77 \\ 100 \\ -33 \end{pmatrix}$$

**GABRIEL PORTO DE FREITAS**

$$C = \begin{pmatrix} 457 & 9 & 228 & 87 & -66 & -13 & 24 \\ -4 & -863 & 136 & 51 & 37 & 261 & -15 \\ -132 & 16 & 597 & 279 & -25 & -45 & 2 \\ 14 & -4 & -43 & 608 & -133 & 26 & 304 \\ -55 & 15 & -110 & -240 & -502 & 1 & -21 \\ 133 & -180 & 33 & 1 & 17 & 575 & -64 \\ -14 & -10 & -235 & -74 & -30 & 111 & 801 \end{pmatrix} \quad d = \begin{pmatrix} 75 \\ -19 \\ 96 \\ 30 \\ 96 \\ -99 \\ -36 \end{pmatrix}$$

**GABRIEL SOUZA BAGGIO**

$$C = \begin{pmatrix} -577 & -100 & 20 & 10 & 1 & 56 & 219 \\ -56 & -978 & 105 & 301 & 33 & -13 & -1 \\ -106 & -277 & 632 & -16 & 23 & -8 & -60 \\ -95 & 267 & -30 & 799 & 4 & 19 & 54 \\ -51 & -172 & 156 & -19 & 568 & 31 & -7 \\ 0 & 10 & 158 & -178 & -76 & 526 & -28 \\ 47 & 4 & -251 & -37 & 14 & 132 & -611 \end{pmatrix} \quad d = \begin{pmatrix} -24 \\ -45 \\ -60 \\ 100 \\ 90 \\ -62 \\ -28 \end{pmatrix}$$

**GABRIEL STIEGEMEIER**

$$C = \begin{pmatrix} 525 & 10 & 113 & -280 & -61 & -28 & -1 \\ 73 & 472 & 19 & -164 & -37 & 155 & 6 \\ 37 & -10 & -407 & -62 & -10 & 88 & -168 \\ 69 & 160 & 10 & -605 & -166 & 29 & 3 \\ 35 & 126 & 205 & -5 & -607 & -13 & -51 \\ 108 & -275 & -30 & -11 & -8 & 917 & 62 \\ 142 & 17 & -3 & 234 & -49 & 26 & -808 \end{pmatrix} \quad d = \begin{pmatrix} -41 \\ 2 \\ 19 \\ 89 \\ 28 \\ 91 \\ 27 \end{pmatrix}$$

**GUILHERME BRIZZI**

$$C = \begin{pmatrix} -905 & -227 & -136 & 63 & 6 & -24 & -17 \\ 29 & -915 & -11 & -240 & 7 & -68 & -154 \\ -21 & 303 & -1016 & 14 & 108 & -2 & -78 \\ -116 & 264 & -80 & -576 & -6 & -12 & -24 \\ 1 & 10 & -55 & -297 & -889 & -24 & 140 \\ 0 & 14 & -71 & 156 & 283 & -909 & -32 \\ -33 & 13 & -7 & -43 & 180 & 134 & -791 \end{pmatrix} \quad d = \begin{pmatrix} -31 \\ 82 \\ 25 \\ 26 \\ 44 \\ 4 \\ 97 \end{pmatrix}$$

**GUILHERME MENEGHETTI EINLOFT**

$$C = \begin{pmatrix} -632 & 55 & 126 & 6 & -33 & 243 & -15 \\ -7 & -508 & -39 & -67 & 148 & 198 & -19 \\ -198 & 46 & -696 & -14 & -86 & 6 & -20 \\ 99 & 282 & -41 & -806 & 16 & -37 & -5 \\ -8 & 11 & 135 & -166 & -803 & -58 & 28 \\ 217 & -5 & 10 & -40 & -27 & 587 & 84 \\ 23 & 0 & -106 & 171 & -75 & 19 & 546 \end{pmatrix} \quad d = \begin{pmatrix} -40 \\ -51 \\ 82 \\ -68 \\ -80 \\ -39 \\ -19 \end{pmatrix}$$

**IGOR GUIMARAES**

$$C = \begin{pmatrix} -516 & 38 & -238 & 75 & -18 & 7 & -108 \\ 0 & -408 & -12 & -117 & -55 & 174 & -25 \\ -11 & 232 & -830 & -158 & -6 & -21 & 56 \\ 10 & 10 & 41 & -613 & 261 & 101 & 35 \\ -304 & -101 & 39 & -14 & 559 & 9 & -75 \\ -214 & -8 & 12 & -148 & -32 & 587 & 41 \\ 39 & 7 & -47 & 210 & 12 & -152 & -795 \end{pmatrix} \quad d = \begin{pmatrix} 11 \\ 19 \\ 66 \\ -83 \\ -39 \\ -74 \\ -48 \end{pmatrix}$$

**JAIME ANTONIO DANIEL FILHO**

$$C = \begin{pmatrix} 555 & 47 & -34 & -10 & -182 & -13 & 89 \\ 22 & -561 & 133 & 306 & 72 & 12 & 6 \\ 10 & 58 & -631 & -120 & 303 & 10 & -22 \\ -69 & -19 & 9 & -968 & 302 & -126 & 27 \\ -116 & -46 & -10 & -161 & -638 & 22 & -17 \\ 295 & -132 & -39 & 2 & -79 & 568 & -17 \\ 65 & -22 & -213 & -3 & -12 & 86 & -436 \end{pmatrix} \quad d = \begin{pmatrix} -82 \\ 66 \\ -17 \\ 20 \\ -20 \\ -59 \\ -18 \end{pmatrix}$$

**JOAO PEDRO AZENHA RIGHI**

$$C = \begin{pmatrix} -883 & 6 & 296 & 20 & 95 & -58 & -39 \\ 28 & 946 & 19 & 105 & 10 & 292 & 64 \\ -7 & 260 & 589 & -51 & -154 & 26 & -16 \\ -272 & 39 & 10 & 976 & -123 & -72 & 15 \\ 30 & 160 & -68 & -6 & -611 & -144 & -17 \\ -9 & -20 & -128 & -210 & -20 & -492 & 65 \\ -20 & -8 & -83 & -69 & -20 & -237 & 442 \end{pmatrix} \quad d = \begin{pmatrix} -37 \\ 78 \\ -65 \\ 47 \\ -53 \\ 43 \\ 15 \end{pmatrix}$$

**JOAO PEDRO DA SILVA MARQUES**

$$C = \begin{pmatrix} 899 & 316 & -13 & 42 & 117 & 8 & 27 \\ 2 & 575 & -44 & 143 & 286 & -13 & -27 \\ -10 & -14 & 633 & 101 & -71 & 30 & -193 \\ -169 & -13 & -61 & -374 & -6 & 34 & -84 \\ -117 & 269 & 11 & 6 & -571 & 67 & -40 \\ 255 & 0 & 16 & 74 & -145 & -633 & 38 \\ -86 & 283 & -71 & -20 & -8 & 35 & -549 \end{pmatrix} \quad d = \begin{pmatrix} -43 \\ -82 \\ 33 \\ 69 \\ 76 \\ -63 \\ 53 \end{pmatrix}$$

**JOAO VITOR DA SILVA**

$$C = \begin{pmatrix} -476 & -8 & 129 & -186 & 21 & 12 & 65 \\ -12 & -906 & -61 & -104 & 7 & 39 & 308 \\ -42 & 37 & -586 & -16 & -10 & -97 & 194 \\ 35 & -10 & 17 & -888 & -41 & -257 & -157 \\ 253 & 44 & 25 & -17 & 554 & -99 & -1 \\ 100 & 4 & -41 & 13 & -22 & -856 & 260 \\ 8 & -57 & 148 & -17 & 34 & -316 & 926 \end{pmatrix} \quad d = \begin{pmatrix} -52 \\ -84 \\ -8 \\ 41 \\ 3 \\ 53 \\ 49 \end{pmatrix}$$

**LARISSA RODRIGUES SILVEIRA**

$$C = \begin{pmatrix} -792 & 109 & 190 & 78 & 24 & -17 & -7 \\ -19 & 603 & -230 & 38 & -68 & -1 & 102 \\ 9 & -21 & -774 & -89 & -53 & -211 & -14 \\ 12 & -97 & -272 & -599 & -47 & -30 & -2 \\ 81 & -1 & 57 & -40 & -551 & 18 & -270 \\ 283 & -68 & 34 & -80 & 19 & -817 & 5 \\ -9 & 64 & -16 & 292 & 153 & 20 & -557 \end{pmatrix} \quad d = \begin{pmatrix} 91 \\ 31 \\ 31 \\ 22 \\ -69 \\ -94 \\ -89 \end{pmatrix}$$

**LEANDRO BRUM DA SILVA LACORTE**

$$C = \begin{pmatrix} 523 & -7 & 67 & 18 & 157 & 33 & -239 \\ 78 & 920 & -123 & -1 & 15 & 40 & 283 \\ -65 & -267 & -564 & -7 & 126 & -28 & 19 \\ -29 & 2 & -255 & 876 & 47 & -147 & -11 \\ 122 & -5 & -60 & 19 & -573 & -36 & -310 \\ -212 & -130 & -5 & -32 & -16 & -930 & -71 \\ 23 & -10 & -9 & -55 & 254 & 96 & -564 \end{pmatrix} \quad d = \begin{pmatrix} 79 \\ -87 \\ 62 \\ 45 \\ -14 \\ -83 \\ 92 \end{pmatrix}$$

**LEANDRO OLIVEIRA GALBARINO DO NASCIMENTO**

$$C = \begin{pmatrix} 970 & 6 & -282 & 15 & 48 & 153 & -21 \\ 114 & 555 & -31 & 5 & -52 & 17 & -199 \\ 0 & 14 & -594 & 197 & 35 & 140 & 47 \\ 257 & -21 & -20 & 571 & 136 & -48 & 5 \\ 9 & 10 & 104 & -301 & 556 & 54 & 24 \\ 68 & -103 & 24 & -16 & 310 & -1040 & -4 \\ 20 & -211 & -129 & 63 & -34 & 7 & 527 \end{pmatrix} \quad d = \begin{pmatrix} -64 \\ 25 \\ 17 \\ -23 \\ 64 \\ 6 \\ 35 \end{pmatrix}$$

**LUCAS XAVIER PAIRE**

$$C = \begin{pmatrix} 583 & 25 & 2 & -80 & -148 & -17 & 282 \\ -17 & -718 & 2 & -39 & 93 & -44 & 174 \\ -17 & 55 & -795 & 204 & -35 & 89 & 10 \\ -32 & 44 & 9 & -633 & -280 & -149 & 15 \\ 18 & -276 & -67 & 4 & 934 & -152 & -22 \\ -38 & 14 & -144 & 0 & 56 & -847 & 267 \\ -39 & -5 & -78 & -276 & 136 & 13 & 593 \end{pmatrix} \quad d = \begin{pmatrix} 73 \\ -10 \\ -9 \\ 34 \\ -73 \\ -67 \\ 10 \end{pmatrix}$$

**TABELA II | PARTE 03/03**

**LUIS FERNANDO DA CRUZ ANTUNES**

$$C = \begin{pmatrix} 736 & 212 & -54 & -16 & -24 & -85 & 3 \\ -310 & -874 & -101 & -6 & -46 & -18 & -32 \\ -9 & 68 & 919 & 19 & -21 & 93 & 305 \\ 0 & -73 & 37 & -611 & -11 & -209 & 103 \\ -10 & 4 & -217 & -60 & 591 & 134 & -33 \\ -5 & -12 & 48 & 94 & 313 & 864 & 21 \\ -114 & -10 & -271 & 20 & -74 & -23 & -606 \end{pmatrix}$$

$$d = \begin{pmatrix} -15 \\ 37 \\ -61 \\ 17 \\ 91 \\ -56 \\ 29 \end{pmatrix}$$

**LUIS GUSTAVO WERLE TOZEVICH**

$$C = \begin{pmatrix} -818 & 192 & -11 & -9 & -149 & -24 & 42 \\ 3 & 388 & 25 & -17 & -60 & -84 & 186 \\ 23 & -102 & 594 & 5 & 14 & -54 & -198 \\ 281 & -89 & -77 & 566 & 35 & 7 & -16 \\ -9 & -16 & 40 & 38 & -867 & 128 & -249 \\ 157 & -32 & 19 & -240 & 40 & 994 & 10 \\ -204 & -70 & 11 & 31 & -89 & 4 & 583 \end{pmatrix}$$

$$d = \begin{pmatrix} -17 \\ -49 \\ -54 \\ -81 \\ 83 \\ -79 \\ -100 \end{pmatrix}$$

**LUIS HENRIQUE SILVEIRA POZZEBON**

$$C = \begin{pmatrix} 434 & 52 & -99 & 195 & -7 & -19 & 29 \\ -52 & -613 & 39 & -1 & -154 & 12 & 303 \\ -203 & -37 & 761 & -65 & -103 & -12 & 1 \\ -150 & 13 & -240 & -966 & -5 & -32 & 46 \\ -16 & 299 & -31 & -93 & 601 & -10 & -55 \\ -55 & -31 & 9 & 106 & 208 & -543 & 13 \\ 9 & 19 & -23 & 54 & -303 & -140 & 934 \end{pmatrix}$$

$$d = \begin{pmatrix} -13 \\ 31 \\ -57 \\ 15 \\ 17 \\ -41 \\ 53 \end{pmatrix}$$

**MATHIAS ECKERT RECKTENVALD**

$$C = \begin{pmatrix} -627 & -20 & 4 & -26 & 46 & -119 & -211 \\ 273 & 836 & 115 & -71 & 6 & -10 & 29 \\ 17 & 10 & -897 & -283 & -103 & -70 & -36 \\ 20 & 35 & 113 & -874 & 65 & 7 & -313 \\ -229 & 39 & -5 & -77 & -576 & 156 & 11 \\ -22 & -73 & 19 & 6 & -123 & -552 & 307 \\ 291 & -8 & 150 & 20 & 48 & -28 & -994 \end{pmatrix}$$

$$d = \begin{pmatrix} 16 \\ 0 \\ 92 \\ 84 \\ -64 \\ -15 \\ 59 \end{pmatrix}$$

**MIGUEL BRONDANI**

$$C = \begin{pmatrix} 787 & 17 & -54 & -197 & -151 & -9 & 32 \\ -117 & -531 & 51 & -195 & -1 & 28 & 20 \\ 4 & 318 & -1018 & 40 & -120 & -10 & -69 \\ -16 & 9 & -59 & 951 & 106 & 26 & -287 \\ 5 & -14 & -50 & 117 & 579 & -31 & -216 \\ -4 & -269 & 114 & -20 & -68 & 582 & -34 \\ 78 & 26 & 131 & -264 & -10 & 15 & -903 \end{pmatrix}$$

$$d = \begin{pmatrix} 10 \\ -11 \\ 99 \\ 51 \\ -50 \\ -52 \\ 36 \end{pmatrix}$$

**MIGUEL MIRON SILVA**

$$C = \begin{pmatrix} -872 & 148 & 255 & 75 & 16 & -8 & -23 \\ 72 & -981 & 15 & -129 & -29 & 246 & 1 \\ 34 & -41 & -986 & 13 & -129 & -287 & -1 \\ 96 & 25 & -160 & -402 & -10 & 2 & -77 \\ -39 & -299 & 15 & 9 & -1098 & 65 & -154 \\ 93 & 68 & 0 & -26 & -11 & 442 & -203 \\ 36 & -15 & 233 & -67 & 4 & -156 & 837 \end{pmatrix}$$

$$d = \begin{pmatrix} -63 \\ -83 \\ 65 \\ 45 \\ -26 \\ -60 \\ 11 \end{pmatrix}$$

**PEDRO DE ANDRADE SANTOS**

$$C = \begin{pmatrix} 1024 & -71 & 316 & 158 & 3 & 39 & 11 \\ 223 & 573 & 46 & -87 & 32 & -14 & -4 \\ 166 & 33 & 752 & 11 & -70 & 0 & 133 \\ -157 & 318 & 30 & 1009 & -16 & 71 & -9 \\ 20 & 42 & -22 & 118 & 776 & -210 & 6 \\ 218 & 3 & 12 & -27 & 53 & -534 & 126 \\ 154 & -277 & -26 & -6 & -56 & -20 & 878 \end{pmatrix}$$

$$d = \begin{pmatrix} 42 \\ -33 \\ 100 \\ -34 \\ -46 \\ -62 \\ -53 \end{pmatrix}$$

**RAFAELA DA ROSA SOARES**

$$C = \begin{pmatrix} -389 & -96 & -14 & -29 & 45 & -10 & 191 \\ 22 & 462 & 100 & 18 & -169 & -3 & -62 \\ -4 & -142 & -836 & 73 & -31 & -14 & -166 \\ -5 & -53 & -183 & 640 & -93 & 23 & -17 \\ 102 & -4 & 70 & -34 & -812 & 211 & -13 \\ -63 & 240 & 7 & 29 & 11 & -452 & -83 \\ 0 & -295 & -143 & -12 & -37 & -56 & -569 \end{pmatrix}$$

$$d = \begin{pmatrix} 71 \\ 22 \\ -66 \\ 18 \\ -15 \\ -16 \\ -9 \end{pmatrix}$$

**TOBIAS VIERO DE OLIVEIRA**

$$C = \begin{pmatrix} 631 & 47 & -105 & -8 & -216 & 16 & -27 \\ 42 & -815 & 130 & -9 & 29 & -237 & -13 \\ 0 & 55 & -1068 & 33 & -298 & 153 & -12 \\ 8 & 225 & -94 & -454 & 75 & -25 & -17 \\ -17 & 21 & 6 & -69 & -445 & -182 & 145 \\ -2 & -22 & -124 & 17 & 237 & 914 & 77 \\ -11 & -33 & -108 & -296 & 53 & 1 & -950 \end{pmatrix}$$

$$d = \begin{pmatrix} 87 \\ -71 \\ -35 \\ 76 \\ -93 \\ -44 \\ -75 \end{pmatrix}$$

**VIVIANE DILKIN ENDLER**

$$C = \begin{pmatrix} -538 & 62 & -16 & -8 & -100 & 32 & 319 \\ 12 & -796 & 8 & -21 & -122 & -75 & 212 \\ -148 & -10 & -639 & -170 & -59 & 4 & -35 \\ 74 & 315 & 9 & 901 & -15 & 37 & 101 \\ 158 & 33 & 256 & -10 & -611 & 5 & 44 \\ -159 & -62 & -267 & -8 & 10 & -930 & -34 \\ 20 & 312 & -5 & -52 & 32 & 133 & -1082 \end{pmatrix}$$

$$d = \begin{pmatrix} -14 \\ 32 \\ 36 \\ 54 \\ -12 \\ -76 \\ -56 \end{pmatrix}$$

**WESLEY LOPES DE OLIVEIRA**

$$C = \begin{pmatrix} -861 & -81 & 19 & -51 & -7 & 25 & 297 \\ 1 & 628 & -41 & 19 & -281 & -85 & 30 \\ -132 & 0 & -578 & 20 & -13 & 316 & 62 \\ 133 & -265 & 7 & -547 & 37 & -52 & 16 \\ 35 & -6 & 238 & -82 & 434 & 54 & -13 \\ 12 & -68 & 172 & -40 & 5 & -805 & 158 \\ -295 & -1 & 129 & 18 & -40 & 44 & -573 \end{pmatrix}$$

$$d = \begin{pmatrix} -64 \\ 89 \\ 44 \\ 24 \\ 62 \\ -84 \\ 86 \end{pmatrix}$$

**TABELA III**

ALAN BESSAUER LENCINA CCB_MNC_AA02_AL01_ABL.pdf	ALEXANDRE CHAGAS BRITES CCB_MNC_AA02_AL02_ACB.pdf	ANA LILIAN ALFONSO TOLEDO CCB_MNC_AA02_AL03_ALAT.pdf
ANDERSON DALMOLIN CATTELAN CCB_MNC_AA02_AL04_ADC.pdf	ARTHUR BOGACKI VERISSIMO CCB_MNC_AA02_AL05_ABV.pdf	BIANCA SABRINA BUBLITZ CCB_MNC_AA02_AL06_BSB.pdf
BRUNO DOS SANTOS UMPIERRE CCB_MNC_AA02_AL07_BSU.pdf	BRUNO PERUSSATTO CCB_MNC_AA02_AL08_BP.pdf	CARLOS EDUARDO VELOZO CORREA CCB_MNC_AA02_AL09_CEV.C.pdf
CELSO MAIA DA SILVA NETO CCB_MNC_AA02_AL10_CMSN.pdf	DAVI DE CASTRO MACHADO CCB_MNC_AA02_AL11_DCM.pdf	DIEGO RIBEIRO CHAVES CCB_MNC_AA02_AL12_DRC.pdf
DOUGLAS MAGALHAES SILVA CCB_MNC_AA02_AL13_DMS.pdf	ENZO HAHN VERONEZE CCB_MNC_AA02_AL14_EHV.pdf	FERNANDO K. LAYDNER JUNIOR CCB_MNC_AA02_AL15_FKLJ.pdf
FERNANDO MARINO MELCHIOR CCB_MNC_AA02_AL16_FMM.pdf	GABRIEL ATARAO DENARDI CCB_MNC_AA02_AL17_GAD.pdf	GABRIEL DA SILVA FRANCA CCB_MNC_AA02_AL18_GSF.pdf
GABRIEL PORTO DE FREITAS CCB_MNC_AA02_AL19_GPF.pdf	GABRIEL SOUZA BAGGIO CCB_MNC_AA02_AL20_GSB.pdf	GABRIEL STIEGEMEIER CCB_MNC_AA02_AL21_GS.pdf
GUILHERME BRIZZI CCB_MNC_AA02_AL22_GB.pdf	GUILHERME MENEGHETTI EINLOFT CCB_MNC_AA02_AL23_GME.pdf	IGOR GUIMARAES CCB_MNC_AA02_AL24_IG.pdf
JAIME ANTONIO DANIEL FILHO CCB_MNC_AA02_AL25_JADF.pdf	JOAO PEDRO AZENHA RIGHI CCB_MNC_AA02_AL26_JPAR.pdf	JOAO PEDRO DA SILVA MARQUES CCB_MNC_AA02_AL27_JPSM.pdf
JOAO VITOR DA SILVA CCB_MNC_AA02_AL28_JVS.pdf	LARISSA RODRIGUES SILVEIRA CCB_MNC_AA02_AL29_LRS.pdf	LEANDRO BRUM DA SILVA LACORTE CCB_MNC_AA02_AL30_LBSL.pdf
LEANDRO O. GALBARINO DO NASCIMENTO CCB_MNC_AA02_AL31_LOGN.pdf	LUCAS XAVIER PAIRE CCB_MNC_AA02_AL32_LXP.pdf	LUIS FERNANDO DA CRUZ ANTUNES CCB_MNC_AA02_AL33_LFCA.pdf
LUIS GUSTAVO WERLE TOZEVICH CCB_MNC_AA02_AL34_LGWT.pdf	LUIS HENRIQUE SILVEIRA POZZEBON CCB_MNC_AA02_AL35_LHSP.pdf	MATHIAS ECKERT RECKTENVALD CCB_MNC_AA02_AL36_MER.pdf
MIGUEL BRONDANI CCB_MNC_AA02_AL37_MB.pdf	MIGUEL MIRON SILVA CCB_MNC_AA02_AL38_MMS.pdf	PEDRO DE ANDRADE SANTOS CCB_MNC_AA02_AL39_PAS.pdf
RAFAELA DA ROSA SOARES CCB_MNC_AA02_AL40_RRS.pdf	TOBIAS VIERO DE OLIVEIRA CCB_MNC_AA02_AL41_TVO.pdf	VIVIANE DILKIN ENDLER CCB_MNC_AA02_AL42_VDE.pdf
WESLEY LOPES DE OLIVEIRA CCB_MNC_AA02_AL43_WLO.pdf		



## EXEMPLO DE SOLUÇÃO | ELIMINAÇÃO GAUSSIANA

PIVOTAMENTO PARCIAL								
$A_0 =$	20.00000000	-28.00000000	30.00000000	88.00000000	47.00000000	-2.00000000	87.00000000	96.00000000
	21.00000000	46.00000000	51.00000000	52.00000000	-15.00000000	42.00000000	68.00000000	81.00000000
	27.00000000	-37.00000000	-93.00000000	-40.00000000	-43.00000000	-13.00000000	-75.00000000	17.00000000
	49.00000000	14.00000000	-62.00000000	36.00000000	-28.00000000	-16.00000000	1.00000000	-9.00000000
	78.00000000	32.00000000	-50.00000000	-51.00000000	-34.00000000	-19.00000000	-5.00000000	75.00000000
	70.00000000	-47.00000000	31.00000000	-82.00000000	7.00000000	60.00000000	33.00000000	-96.00000000
	-31.00000000	-62.00000000	6.00000000	-30.00000000	-79.00000000	-12.00000000	11.00000000	33.00000000
$A_1 =$	78.00000000	32.00000000	-50.00000000	-51.00000000	-34.00000000	-19.00000000	-5.00000000	75.00000000
	$0. \times 10^{-14}$	37.38461538	64.46153846	65.73076923	-5.846153846	47.11538462	69.34615385	60.80769231
	$0. \times 10^{-13}$	-48.07692308	-75.69230769	-22.34615385	-31.23076923	-6.423076923	-73.26923077	-8.961538462
	$0. \times 10^{-13}$	-6.102564103	-30.58974359	68.03846154	-6.641025641	-4.064102564	4.141025641	-56.11538462
	$0. \times 10^{-14}$	-36.20512821	42.82051282	101.0769231	55.71794872	2.871794872	88.28205128	76.76923077
	$0. \times 10^{-13}$	-75.71794872	75.87179487	-36.23076923	37.51282051	77.05128205	37.48717949	-163.3076923
	$0. \times 10^{-13}$	-49.28205128	-13.87179487	-50.26923077	-92.51282051	-19.55128205	9.012820513	62.80769231
$A_2 =$	78.00000000	32.00000000	-50.00000000	-51.00000000	-34.00000000	-19.00000000	-5.00000000	75.00000000
	$0. \times 10^{-14}$	-75.71794872	75.87179487	-36.23076923	37.51282051	77.05128205	37.48717949	-163.3076923
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-123.8669150	0.6584828987	-55.04944125	-55.34659668	-97.07162208	94.73027430
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-36.70470708	70.95851676	-9.664409076	-10.27412801	1.119708771	-42.95343718
	$0. \times 10^{-14}$	$0. \times 10^{-13}$	6.541821876	118.4009482	37.78090078	-33.97087707	70.35726380	154.8560786
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	101.9221131	47.84236370	12.67524551	85.15831358	87.85489333	-19.82306129
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-63.25397900	-26.68794446	-116.9285472	-69.70115137	-15.38621741	169.0987132
$A_3 =$	78.00000000	32.00000000	-50.00000000	-51.00000000	-34.00000000	-19.00000000	-5.00000000	75.00000000
	$0. \times 10^{-14}$	-75.71794872	75.87179487	-36.23076923	37.51282051	77.05128205	37.48717949	-163.3076923
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-123.8669150	0.6584828987	-55.04944125	-55.34659668	-97.07162208	94.73027430
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	70.76339265	6.648047045	6.126382324	29.88433453	-71.02426602
	$0. \times 10^{-14}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	118.4357249	34.87355753	-36.89391408	65.23059006	159.8590980
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	48.38418690	-32.62139707	39.61716091	7.980902403	58.12438522
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	-27.02420587	-88.81695505	-41.43781354	34.18445564	120.7236747
$A_4 =$	78.00000000	32.00000000	-50.00000000	-51.00000000	-34.00000000	-19.00000000	-5.00000000	75.00000000
	$0. \times 10^{-14}$	-75.71794872	75.87179487	-36.23076923	37.51282051	77.05128205	37.48717949	-163.3076923
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-123.8669150	0.6584828987	-55.04944125	-55.34659668	-97.07162208	94.73027430
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	118.4357249	34.87355753	-36.89391408	65.23059006	159.8590980
	$0. \times 10^{-14}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-14.18832853	28.16988763	-9.089867407	-166.5374411
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	-46.86818560	54.68931956	-18.66755240	-7.182366476
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	-80.85964150	-49.85612424	49.06851953	157.1997057
$A_5 =$	78.00000000	32.00000000	-50.00000000	-51.00000000	-34.00000000	-19.00000000	-5.00000000	75.00000000
	$0. \times 10^{-14}$	-75.71794872	75.87179487	-36.23076923	37.51282051	77.05128205	37.48717949	-163.3076923
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-123.8669150	0.6584828987	-55.04944125	-55.34659668	-97.07162208	94.73027430
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	118.4357249	34.87355753	-36.89391408	65.23059006	159.8590980
	$0. \times 10^{-14}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-80.85964150	-49.85612424	49.06851953	157.1997057
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	83.58712371	-47.10884199	-98.29908238
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	36.91807222	-17.69985210	-194.1210542
$A_6 =$	78.00000000	32.00000000	-50.00000000	-51.00000000	-34.00000000	-19.00000000	-5.00000000	75.00000000
	$0. \times 10^{-14}$	-75.71794872	75.87179487	-36.23076923	37.51282051	77.05128205	37.48717949	-163.3076923
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-123.8669150	0.6584828987	-55.04944125	-55.34659668	-97.07162208	94.73027430
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	118.4357249	34.87355753	-36.89391408	65.23059006	159.8590980
	$0. \times 10^{-14}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-13}$	-80.85964150	-49.85612424	49.06851953	157.1997057
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	83.58712371	-47.10884199	-98.29908238
	$0. \times 10^{-13}$	$0. \times 10^{-13}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	$0. \times 10^{-12}$	3.106793154	-150.7051253
SOLUÇÃO   RETROSUBSTITUIÇÃO								
$x_7 = -48.50825845$	$x_6 = -28.51476231$	$x_5 = -13.79912871$	$x_4 = -12.47455486$	$x_3 = 41.26488268$	$x_2 = 23.24708141$	$x_1 = 56.24732188$		

**PIVOTAMENTO TOTAL**

$$\begin{aligned}
 A_0 &= \begin{pmatrix} 20.00000000 & -28.00000000 & 30.00000000 & 88.00000000 & 47.00000000 & -2.00000000 & 87.00000000 & 96.00000000 \\ 21.00000000 & 46.00000000 & 51.00000000 & 52.00000000 & -15.00000000 & 42.00000000 & 68.00000000 & 81.00000000 \\ 27.00000000 & -37.00000000 & -93.00000000 & -40.00000000 & -43.00000000 & -13.00000000 & -75.00000000 & 17.00000000 \\ 49.00000000 & 14.00000000 & -62.00000000 & 36.00000000 & -28.00000000 & -16.00000000 & 1.00000000 & -9.00000000 \\ 78.00000000 & 32.00000000 & -50.00000000 & -51.00000000 & -34.00000000 & -19.00000000 & -5.00000000 & 75.00000000 \\ 70.00000000 & -47.00000000 & 31.00000000 & -82.00000000 & 7.00000000 & 60.00000000 & 33.00000000 & -96.00000000 \\ -31.00000000 & -62.00000000 & 6.00000000 & -30.00000000 & -79.00000000 & -12.00000000 & 11.00000000 & 33.00000000 \end{pmatrix} \\
 A_1 &= \begin{pmatrix} -93.00000000 & -37.00000000 & 27.00000000 & -40.00000000 & -43.00000000 & -13.00000000 & -75.00000000 & 17.00000000 \\ 0. \times 10^{-13} & 25.70967742 & 35.80645161 & 30.06451613 & -38.58064516 & 34.87096774 & 26.87096774 & 90.32258065 \\ 0. \times 10^{-13} & -39.93548387 & 28.70967742 & 75.09677419 & 33.12903226 & -6.193548387 & 62.80645161 & 101.4838710 \\ 0. \times 10^{-13} & 38.66666667 & 31.00000000 & 62.66666667 & 0.666666667 & -7.333333333 & 51.00000000 & -20.33333333 \\ 0. \times 10^{-13} & 51.89247312 & 63.48387097 & -29.49462366 & -10.88172043 & -12.01075269 & 35.32258065 & 65.86021505 \\ 0. \times 10^{-13} & -59.33333333 & 79.00000000 & -95.33333333 & -7.333333333 & 55.66666667 & 8.00000000 & -90.33333333 \\ 0. \times 10^{-14} & -64.38709677 & -29.25806452 & -32.58064516 & -81.77419355 & -12.83870968 & 6.161290323 & 34.09677419 \end{pmatrix} \\
 A_2 &= \begin{pmatrix} -93.00000000 & -40.00000000 & 27.00000000 & -37.00000000 & -43.00000000 & -13.00000000 & -75.00000000 & 17.00000000 \\ 0. \times 10^{-13} & -95.33333333 & 79.00000000 & -59.33333333 & -7.333333333 & 55.66666667 & 8.00000000 & -90.33333333 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 90.94022107 & -86.67403564 & 27.35235732 & 37.65666591 & 69.10827882 & 30.32573878 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 82.93006993 & -0.3356643357 & -4.153846154 & 29.25874126 & 56.25874126 & -79.71328671 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 39.04252199 & 70.24926686 & -8.612903226 & -29.23313783 & 32.84750733 & 93.80791789 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 60.72005414 & 6.998195353 & -40.89330025 & 52.42612226 & 29.39386420 & 61.83487480 \\ 0. \times 10^{-14} & 0. \times 10^{-13} & -56.25671103 & -44.10963230 & -79.26799007 & -31.86307241 & 3.427250169 & 64.96864426 \end{pmatrix} \\
 A_3 &= \begin{pmatrix} -93.00000000 & -40.00000000 & 27.00000000 & -37.00000000 & -43.00000000 & -13.00000000 & -75.00000000 & 17.00000000 \\ 0. \times 10^{-13} & -95.33333333 & 79.00000000 & -59.33333333 & -7.333333333 & 55.66666667 & 8.00000000 & -90.33333333 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 90.94022107 & -86.67403564 & 27.35235732 & 37.65666591 & 69.10827882 & 30.32573878 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 78.70399218 & -29.09696680 & -5.081069014 & -6.762376655 & -107.3678889 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 107.4602270 & -20.35583721 & -45.39992509 & 3.177890697 & 80.78844961 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 64.86975180 & -59.15624922 & 27.28306932 & -16.74917770 & 41.58662294 \\ 0. \times 10^{-14} & 0. \times 10^{-13} & 0. \times 10^{-13} & -97.72722988 & -62.34749391 & -8.568207413 & 46.17845998 & 83.72850984 \end{pmatrix} \\
 A_4 &= \begin{pmatrix} -93.00000000 & -40.00000000 & 27.00000000 & -37.00000000 & -43.00000000 & -13.00000000 & -75.00000000 & 17.00000000 \\ 0. \times 10^{-13} & -95.33333333 & 79.00000000 & -59.33333333 & -7.333333333 & 55.66666667 & 8.00000000 & -90.33333333 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 90.94022107 & -86.67403564 & 27.35235732 & 37.65666591 & 69.10827882 & 30.32573878 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 107.4602270 & -20.35583721 & -45.39992509 & 3.177890697 & 80.78844961 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & -14.18832853 & 28.16988763 & -9.089867407 & -166.5374411 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & -46.86818560 & 54.68931956 & -18.66755240 & -7.182366476 \\ 0. \times 10^{-14} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & -80.85964150 & -49.85612424 & 49.06851953 & 157.1997057 \end{pmatrix} \\
 A_5 &= \begin{pmatrix} -93.00000000 & -40.00000000 & 27.00000000 & -37.00000000 & -43.00000000 & -13.00000000 & -75.00000000 & 17.00000000 \\ 0. \times 10^{-13} & -95.33333333 & 79.00000000 & -59.33333333 & -7.333333333 & 55.66666667 & 8.00000000 & -90.33333333 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 90.94022107 & -86.67403564 & 27.35235732 & 37.65666591 & 69.10827882 & 30.32573878 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 107.4602270 & -20.35583721 & -45.39992509 & 3.177890697 & 80.78844961 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & -80.85964150 & -49.85612424 & 49.06851953 & 157.1997057 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 0. \times 10^{-12} & 83.58712371 & -47.10884199 & -98.29908238 \\ 0. \times 10^{-14} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 0. \times 10^{-12} & 36.91807222 & -17.69985210 & -194.1210542 \end{pmatrix} \\
 A_6 &= \begin{pmatrix} -93.00000000 & -40.00000000 & 27.00000000 & -37.00000000 & -43.00000000 & -13.00000000 & -75.00000000 & 17.00000000 \\ 0. \times 10^{-13} & -95.33333333 & 79.00000000 & -59.33333333 & -7.333333333 & 55.66666667 & 8.00000000 & -90.33333333 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 90.94022107 & -86.67403564 & 27.35235732 & 37.65666591 & 69.10827882 & 30.32573878 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 107.4602270 & -20.35583721 & -45.39992509 & 3.177890697 & 80.78844961 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & -80.85964150 & -49.85612424 & 49.06851953 & 157.1997057 \\ 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 0. \times 10^{-12} & 83.58712371 & -47.10884199 & -98.29908238 \\ 0. \times 10^{-14} & 0. \times 10^{-13} & 0. \times 10^{-13} & 0. \times 10^{-12} & 0. \times 10^{-12} & 0. \times 10^{-12} & 3.106793154 & -150.7051253 \end{pmatrix}
 \end{aligned}$$

**SOLUÇÃO | RETROSUBSTITUIÇÃO**

$$x_7 = -48.50825845 \quad x_6 = -28.51476231 \quad x_5 = -13.79912871 \quad x_2 = -12.47455486 \quad x_1 = 41.26488268 \quad x_4 = 23.24708141 \quad x_3 = 56.24732188$$

## EXEMPLO DE SOLUÇÃO | MÉTODOS ITERATIVOS

### SISTEMA LINEAR

$$C = \begin{pmatrix} -822 & -84 & -17 & 26 & 8 & 64 & 213 \\ -51 & 542 & 94 & 11 & 7 & -236 & 31 \\ -15 & 180 & 436 & 5 & 34 & 63 & -108 \\ -6 & 64 & 10 & -494 & -225 & -22 & 108 \\ -11 & -42 & 33 & 179 & -479 & -144 & -9 \\ 197 & -52 & -134 & -2 & 29 & -637 & 19 \\ -10 & -17 & 263 & 131 & -61 & 40 & 939 \end{pmatrix} \quad \mathbf{d} = \begin{pmatrix} 2 \\ 96 \\ -4 \\ -39 \\ -27 \\ 45 \\ 15 \end{pmatrix}$$

### MÉTODO DE JACOBI

$k$	$x_{1,k}$	$x_{2,k}$	$x_{3,k}$	$x_{4,k}$	$x_{5,k}$	$x_{6,k}$	$x_{7,k}$
0	0.	0.	0.	0.	0.	0.	0.
1	-0.002433090024	0.1771217712	-0.009174311927	0.07894736842	0.05636743215	-0.07064364207	0.01597444089
2	-0.01865855429	0.1444800691	-0.07351801752	0.08270319086	0.09070018944	-0.08113032632	0.01738193507
3	-0.01399102645	0.1489462619	-0.06145677432	0.06250621278	0.09403170638	-0.06835498989	0.03679299344
4	-0.009278731634	0.1521129958	-0.06020594946	0.0654296727	0.08261101969	-0.0690192404	0.03603527971
5	-0.009894948503	0.1521817454	-0.06058582776	0.07087368157	0.08361772109	-0.06863525612	0.03467098298
6	-0.01003575069	0.1523113837	-0.06116977528	0.0701084973	0.08554427108	-0.06876348425	0.03406161005
7	-0.01021026157	0.1523690775	-0.06150201752	0.06911019201	0.08525995995	-0.06862283751	0.03446337985
8	-0.01012857085	0.1524724724	-0.06141902223	0.06932412716	0.0848131265	-0.0686094514	0.03467043473
9	-0.01008374	0.1524611802	-0.06137715171	0.06958639849	0.08487993435	-0.06862492523	0.03459048699
10	-0.01009642726	0.1524497862	-0.06139673261	0.0695380206	0.0849869431	-0.06861911345	0.03454744235
11	-0.01010604812	0.1524565807	-0.0614117573	0.06947789399	0.08496786753	-0.06861424831	0.03456603849
12	-0.01010332168	0.1524608026	-0.06140881289	0.06949112411	0.08494217658	-0.0686147427	0.03457720905
13	-0.0101007895	0.1524597577	-0.06140577192	0.06950586307	0.0849468294	-0.0686157415	0.03457299621
14	-0.01010140354	0.1524589154	-0.06140668447	0.06950276274	0.08495295969	-0.0686154729	0.0345704411
15	-0.01010197817	0.1524592627	-0.06140747208	0.0694992799	0.08495179346	-0.06861518947	0.03457149423
16	-0.01010182393	0.1524594941	-0.06140728445	0.06950006473	0.08495031542	-0.0686152406	0.03457211305
17	-0.01010168465	0.1524594216	-0.06140710776	0.0695009074	0.08495060154	-0.06861530255	0.034571863
18	-0.01010172107	0.1524593706	-0.06140715799	0.06950071767	0.0849509551	-0.06861528781	0.03457171735

$k$	$ER_{1,k}$	$ER_{2,k}$	$ER_{3,k}$	$ER_{4,k}$	$ER_{5,k}$	$ER_{6,k}$	$ER_{7,k}$
0	-	-	-	-	-	-	-
1	1.	1.	1.	1.	1.	1.	1.
2	0.8695992205	0.2259252942	0.8752100201	0.0454132713	0.3785301608	0.129257267	0.08097453863
3	0.3336086778	0.02998526276	0.1962557152	0.3231195298	0.03542971903	0.1868969105	0.5275748603
4	0.507859803	0.02081829962	0.02077576832	0.04468094966	0.1382465286	0.00962413531	0.02102699756
5	0.06227590466	0.0004517594662	0.006270085126	0.07681284158	0.01203933082	0.005594563301	0.03934981395
6	0.01403006028	0.0008511402107	0.00954634082	0.01091428711	0.02252108716	0.001864770776	0.01789031494
7	0.01709171442	0.0003786452374	0.005402135632	0.01444512393	0.003334638309	0.002049561762	0.01165787574
8	0.008065374474	0.0006781215572	0.001351296185	0.003086012819	0.005268446819	0.0001951059388	0.005972088017
9	0.00444585549	0.00007406594656	0.0006821842115	0.003769002853	0.0007870864682	0.0002254840761	0.002311263858
10	0.001256609415	0.0000747392525	0.0003189241625	0.0006957041436	0.001259119837	0.00008469610819	0.001245957431
11	0.0009519895738	0.00004456670055	0.0002446548734	0.0008654064344	0.0002245033398	0.00007090576407	0.0005379886737
12	0.0002698556898	0.00002769174517	0.0000479476011	0.0001903857241	0.0003024522022	$7.205271248 \times 10^{-6}$	0.0003230615215
13	0.000250691083	$6.854188368 \times 10^{-6}$	0.0000495225369	0.0002120535409	0.0000547733609	0.00001455648004	0.0001218535701
14	0.0000607875871	$5.524783764 \times 10^{-6}$	0.00001486079512	0.00004460723893	0.00007216090932	$3.914573816 \times 10^{-6}$	0.00007391024219
15	0.00005688309924	$2.278190741 \times 10^{-6}$	0.0000128259573	0.0000501133358	0.00001372813329	$4.130780079 \times 10^{-6}$	0.00003046233687
16	0.00001526861698	$1.518126745 \times 10^{-6}$	$3.055565696 \times 10^{-6}$	0.00001129247394	0.00001739882938	$7.451635897 \times 10^{-7}$	0.00001789947247
17	0.00001378757919	$4.756966356 \times 10^{-7}$	$2.877292682 \times 10^{-6}$	0.00001212461017	$3.368079503 \times 10^{-6}$	$9.029964222 \times 10^{-7}$	$7.232794949 \times 10^{-6}$
18	$3.605598196 \times 10^{-6}$	$3.34592697 \times 10^{-7}$	$8.179713825 \times 10^{-7}$	$2.729994722 \times 10^{-6}$	$4.161934985 \times 10^{-6}$	$2.149315377 \times 10^{-7}$	$4.213027558 \times 10^{-6}$

MÉTODO DE GAUSS-SEIDEL

$k$	$x_{1,k}$	$x_{2,k}$	$x_{3,k}$	$x_{4,k}$	$x_{5,k}$	$x_{6,k}$	$x_{7,k}$
0	0.	0.	0.	0.	0.	0.	0.
1	-0.002433090024	0.1768928273	-0.08228716805	0.1002284773	0.07269871846	-0.06553133337	0.03572983705
2	-0.0107738875	0.1568286008	-0.06278981391	0.07574306826	0.08587181704	-0.06883209506	0.0342291705
3	-0.01041888332	0.1524559488	-0.06161362101	0.06901509208	0.08483438206	-0.06868364679	0.03468925531
4	-0.01008849478	0.1524713153	-0.06135802593	0.06958473427	0.08500265682	-0.06861689633	0.0345500809
5	-0.01010656184	0.1524485776	-0.06141303485	0.06947085154	0.08494126626	-0.06861564442	0.03457673039
6	-0.01010029723	0.1524608324	-0.06140536496	0.06950625012	0.08495292747	-0.06861510622	0.0345706669
7	-0.01010200431	0.1524590537	-0.0614075844	0.06949933461	0.08495033757	-0.06861529912	0.03457204291
8	-0.01010167905	0.1524594803	-0.06140709935	0.06950088478	0.08495093754	-0.0686152719	0.03457173979
9	-0.01010175423	0.1524593791	-0.06140720373	0.06950052972	0.08495080578	-0.06861527886	0.03457180766
$k$	$ER_{1,k}$	$ER_{2,k}$	$ER_{3,k}$	$ER_{4,k}$	$ER_{5,k}$	$ER_{6,k}$	$ER_{7,k}$
0	-	-	-	-	-	-	-
1	1.	1.	1.	1.	1.	1.	1.
2	0.7741678642	0.1279372922	0.3105177881	0.3232693057	0.1534042138	0.04795381699	0.04384174461
3	0.03407315068	0.02868141251	0.01908981957	0.0974855785	0.01222894475	0.002161333584	0.01326303514
4	0.03274904198	0.00010078271	0.004165633891	0.008186309716	0.001979641142	0.0009727991254	0.004028193528
5	0.001787656678	0.000149149921	0.0008957205923	0.001639287876	0.0007227412635	0.00001824531832	0.00077073481
6	0.0006202397984	0.00008037990727	0.0001249059428	0.0005092862149	0.0001372667005	$7.843693146 \times 10^{-6}$	0.0001753939259
7	0.0001689837775	0.00001166681262	0.0000361427268	0.00009950457721	0.00003048720769	$2.811351559 \times 10^{-6}$	0.00003980101466
8	0.00003219848954	$2.798326946 \times 10^{-6}$	$7.898869487 \times 10^{-6}$	0.00002230428033	$7.062505362 \times 10^{-6}$	$3.966702231 \times 10^{-7}$	$8.767698673 \times 10^{-6}$
9	$7.442546094 \times 10^{-6}$	$6.63904358 \times 10^{-7}$	$1.699782801 \times 10^{-6}$	$5.108698695 \times 10^{-6}$	$1.55101131 \times 10^{-6}$	$1.013767003 \times 10^{-7}$	$1.963239884 \times 10^{-6}$