Drawing text in 2D Plots

to :=

Chars

Drawing Characters

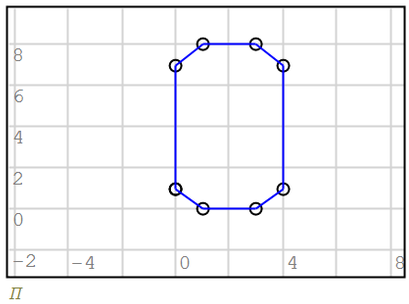
Let's try to draw an O given it's xy coordinates and convering them into a complex vector. We go to use this auxiliary function

$$ReIm(Z) := \left| \text{eval}\left(\text{augment}\left(\overrightarrow{\text{Re}(Z)}, \overrightarrow{\text{Im}(Z)}\right)\right)\right.$$

$$O := \begin{bmatrix} 0 & 0 & 1 & 3 & 4 & 4 & 3 & 1 & 0 \\ 1 & 7 & 8 & 8 & 7 & 1 & 0 & 0 & 1 \end{bmatrix}$$

$$Z := \text{row}(O, 1) + i \cdot \text{row}(O, 2)^T$$

$$\Pi := \begin{cases} ReIm(Z) \\ \text{augment}(ReIm(Z), \text{"o"}) \end{cases}$$



Π

Now, we want the same letter but with curved borders.
np is the number of points pr. unit length of the arc.

```
txtChar(M, np) :=
:= | Z := eval(row(M, 1) + i·row(M, 2)^T)
   | if rows(M) = 2
   |   Z
   | else
   |   S := matrix(0, 1)
   |   for c ∈ [1..(cols(M) − 1)]
   |     if M_(3,c) = 0
   |       S := eval(stack(S, Z_c, Z_(c+1)))
   |     else
   |       [v := 0.25·M_(3,c)·π   R := 1/(2·sin(v))   H := (1 + i·cot(v))/2]
   |       m := |Z_(c+1) − Z_c|·np·|2·v·R| + 1
   |       t := π/2 − v + (2·v/m)·[0..m]
   |       S := eval(stack(S, Z_c + (Z_(c+1) − Z_c)·(H − R·e^(i·t))))
   |   S
```

Convert xy pairs into complexes.

If there are not arcs, that's all.

Not an arc, just draw a line between Zc+1 and Zc

Number of points (m+1)

Range variable

Draw an arc between Zc+1 and Zc

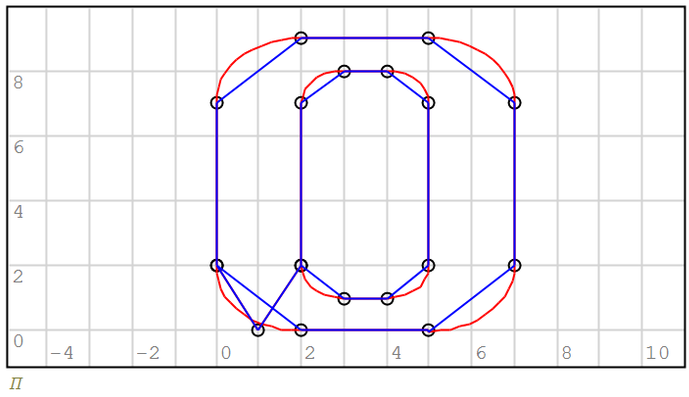
We write points as before and add a third row indicating the value of np.NaN indicate a halt in the drawing. SMath can't handle it

$$O := \begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 2 & 0 & 0 & \text{NaN} & 2 & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 \\ 2 & 0 & 0 & 2 & 7 & 9 & 9 & 7 & 2 & 0 & 2 & 7 & 8 & 8 & 7 & 2 & 1 & 1 & 2 \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 \end{bmatrix}$$

$$A := txtChar(O, 0)$$
$$B := txtChar(O, 4)$$

$$Z := \text{row}(O, 1) + i \cdot \text{row}(O, 2)^T$$

$$\Pi := \begin{cases} ReIm(A) \\ ReIm(B) \\ \text{augment}(ReIm(Z), \text{"o"}) \end{cases}$$



Π

We define NaN as a big number, and cycle colors (Ber idea) and try to emulate the halts.

```
txtNaN(Z, C):=| r:=[1..length(Z)]
              | if C>0
              |   A:=eval(augment(|Z|≥0.001 NaN_r, r))
              | else
              |   A:=eval(augment(|Z|<0.001 NaN_r, r))
              | if (f:=findrows(A, 1, 1))≠0
              |   eval(col(f, 2))
              | else
              |   0
```

If C ...

Locate where are NaN's

Locate where are not NaN's

```
txtPlot(S):=| [P:=0 r:=0]
            | if (f:=txtNaN(S, 1))=0
            |   P:={ReIm(S)
            | else
            |   f:=eval(stack(0, f, length(S)+1))
            |   for k∈[2..length(f)]
            |     Z:=S[(f_(k-1)+1)..(f_k-1)]
            |     if normi(Z)>0.001 NaN
            |       continue
            |     else
            |       P_(r:=r+1):=ReIm(Z)
            |       if k=length(f)
            |         continue
            |       else
            |         for j∈[1..CycleColors]
            |           P_(r:=r+1):=""
            |   mat2sys_1(P)
```

Locate NaN's

If there are not one, returns real and imag parts. That's all.

Discard NaN's

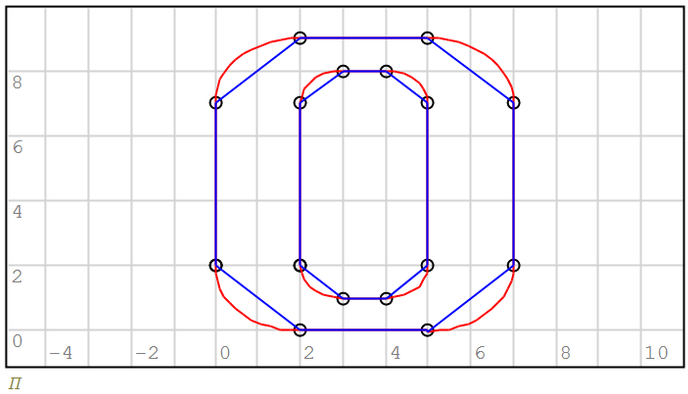
If there are two consecutive NaN, discard Z

Acept Z

Cycle colors as Ber procedure, only if isn't at the end.

Using $NaN:=1000000$ $CycleColors:=5$

$$\Pi:=\begin{cases} txtPlot(A) \\ txtPlot(B) \\ augment(ReIm(Z), "o") \end{cases}$$



Π

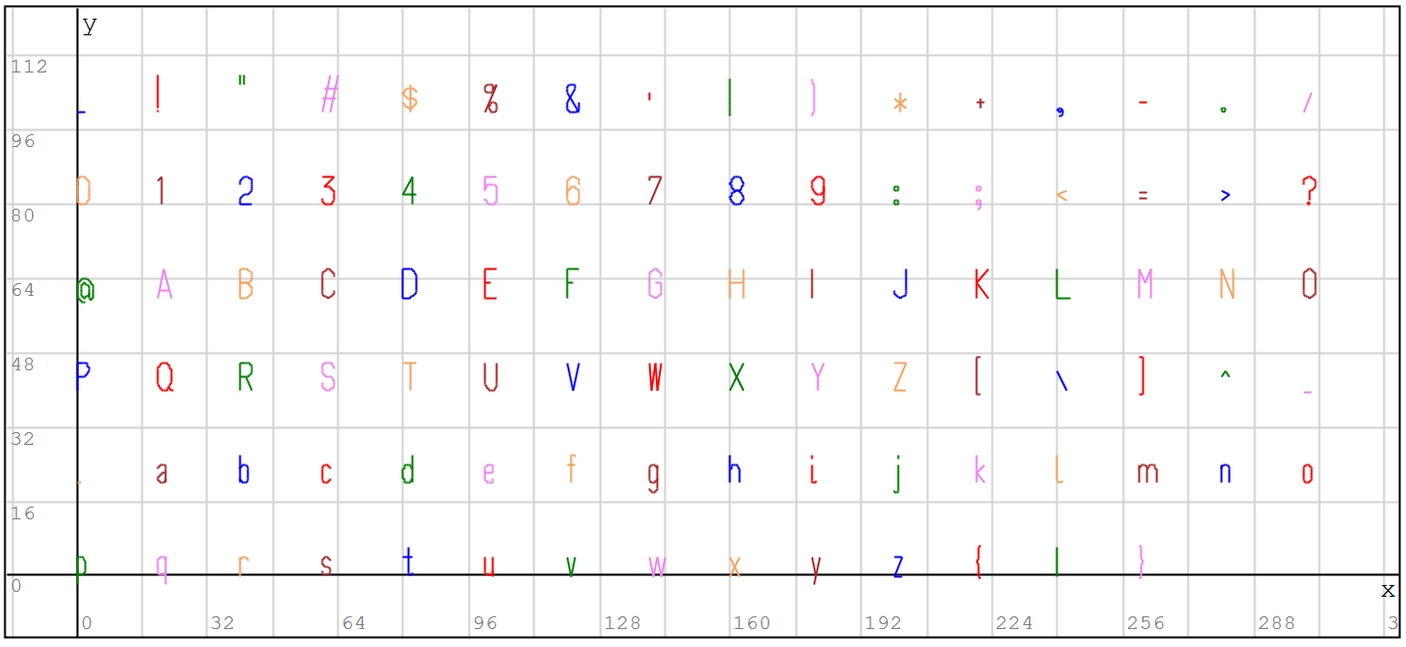
Characters set

Fonts

At the bottom of this document there are two fonts, one normal with size 3x6 and the other double with size 7x9. The las row of the file have the string with the avaible characters.

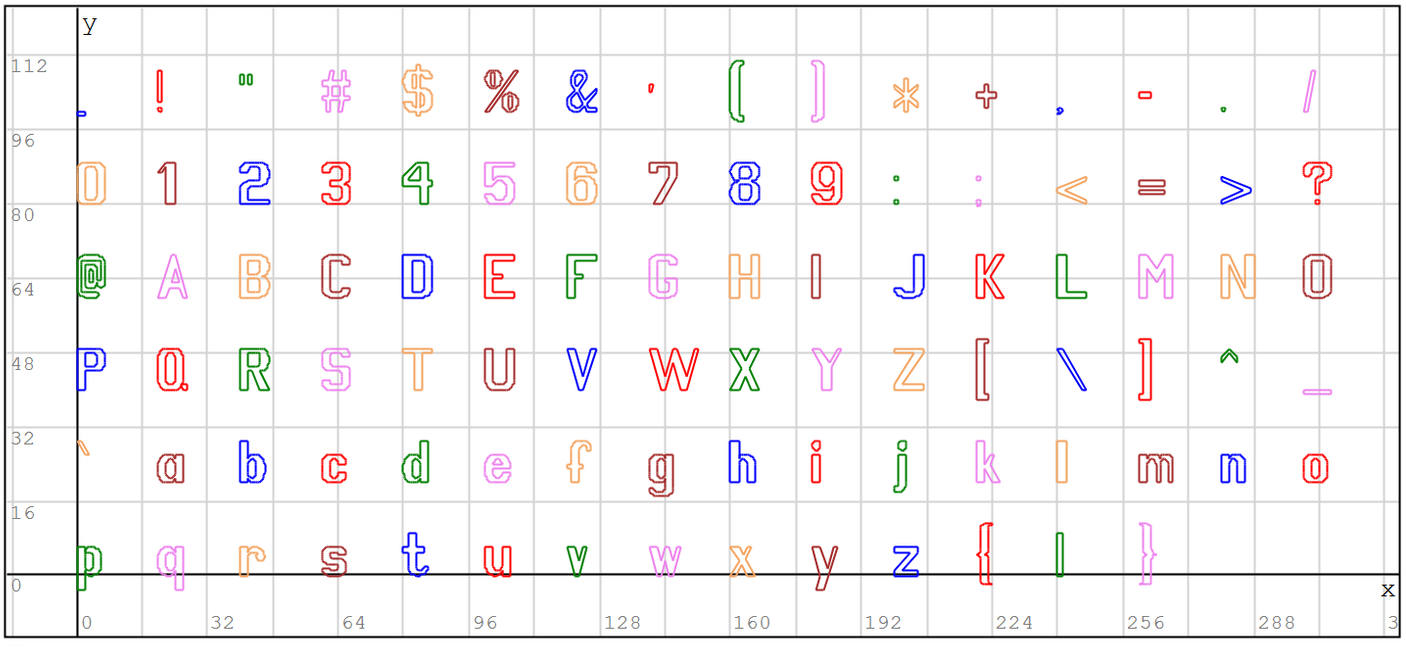
Characters set: $n:=length(\text{Φ01})-1=94$ $M:=0$ $r:=[1..6]$ $c:=[1..16]$

$$\Pi:=mat2sys_1\left(\left[M_{r\,c}:=txtPlot\left(txtChar\left(\text{Φ01}_{\min([16\cdot(r-1)+c\;n])},\,4\right)+20\cdot(c-1)+i\cdot20\cdot(6-r)\right)\right]_{[1..n]}\right)$$



Characters set: $n := \text{length}(\text{Φ00}) - 1 = 94$ $M := 0$ $r := [1..6]$ $c := [1..16]$

$$\Pi := \text{mat2sys}_1\left(\left(M_{r\,c} := txtPlot\left(txtChar\left(\text{Φ00}_{\min([16\cdot(r-1)+c\;n])},\,4\right)+20\cdot(c-1)+i\cdot 20\cdot(6-r)\right)\right)_{[1..n]}\right)$$



Words

Drawing Words

For draw words we use following parameters:

s	text
ap = x+i*y	anchor point of the text
it	italicization factor
sp	space between the characters
wh = wi+i*he	wi: width relative to the font's default he height relative to the font's default
aa = ha+i*va	ha: horizontal alignment: 0 is left, 1 is center and 2 is right va: vertical alignment: 0 is bottom, 1 is center and 2 is top
an	angle between the positive x axis and the base line of the text
sc	character scaling factor
np	number of points pr. unit length of the arc
fo	font with char matrices and avaible strings

cc control characters for sub, superscript and new line (not implemented yet)

```
txtΔz(Z):=|W:=eval(Z txtNaN(Z,0))
          |[R I]:=eval([Re(W) Im(W)])
          |eval(max(R)-min(R)+i·(max(I)-min(I)))
```

With and Heigth of a vector of complexes discarding the NaN's

```
txtStack(P,Q):=|if P=NaN
               |  Q
               |else
               |  stack(P, if |P length(P) - Q 1|<TOL
               |              Q
               |           [2..length(Q)]
               |         else
               |           stack(NaN,Q)
```

Discard P if it is NaN

Discard first point in Q if it is close to last in P, and draw constinously or ...

Halt with a NaN between P and Q.

```
TOL:=10^-5
```

Defalut value for assume that two points are the same.

```
txtWord(s,ap,it,sp,wh,aa,an,sc,N,fo,cc):=
:=|[zo:=0 r:=0 Z:=NaN v:=0]
  |wo:=eval(Re(txtΔz(sc·txtChar(fo 1,N))))
  |for k∈[1..strlen(s)]
  |  |f:=findstr(fo length(fo),substr(s,k,1))
  |  |if f≠-1
  |  |  |char:=eval(sc·txtChar(fo (f 1),N))
  |  |  |Z:=eval(txtStack(Z,char+zo))
  |  |  |zo:=eval(zo+sp+Re(txtΔz(char)))
  |  |else
  |  |  zo:=eval(zo+sp+wo)
  |  |Z:=eval(Z-0.5·it·i·(Z-conj(Z)))
  |  |Z:=eval(0.5·(Z·(Re(wh)+Im(wh))+conj(Z)·(Re(wh)-Im(wh))))
  |  |Δz:=0.5·txtΔz(Z)
  |  |Z:=eval(Z-Re(aa)·Re(Δz)-i·Im(aa)·Im(Δz))
  |  |eval(ap+e^(i·an)·Z)
```

With for blanks

Draw each char

Update displacements

Italics

wi & he relatives factors

Alignments

Rotate and trasnlate

Examples

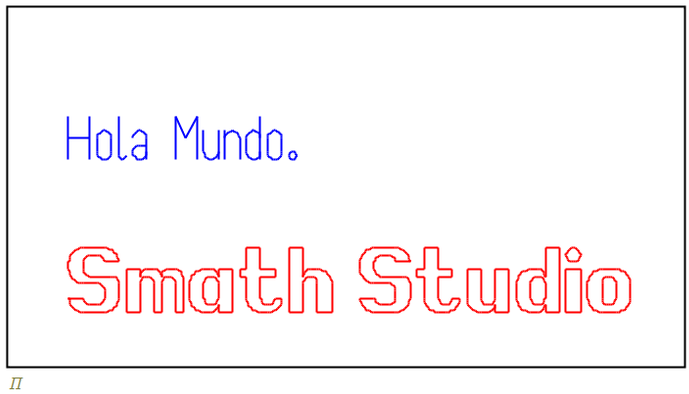
```
str1:="Hola Mundo."
```

```
str2:="Smath Studio"
```

Normal text

```
Word(s,fo):=|txtWord(s,0,0,1,1+i,i,0,1,4,fo,0)
```

```
|A:=Word(str1,Φ01)
|B:=Word(str2,Φ00)
|Π:={txtPlot(A+20·i)
     txtPlot(B)
```

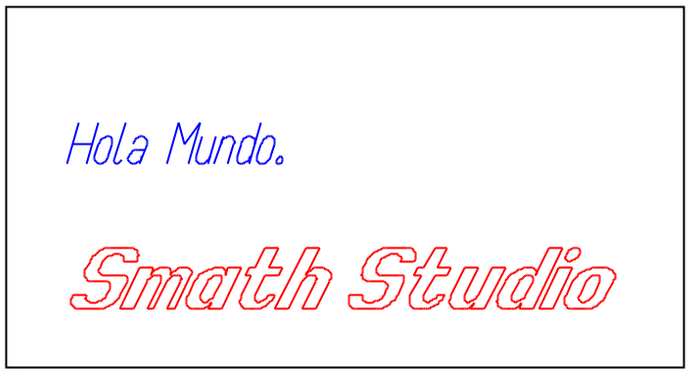


Π

Italics

$Word(s, it, fo) := \left| txtWord(s, 0, it, 1, 1+i, i, 0, 1, 4, fo, 0) \right.$

$$A := Word(str1, 0.3, \Phi 01)$$
$$B := Word(str2, 0.5, \Phi 00)$$
$$\Pi := \begin{cases} txtPlot(A + 20 \cdot i) \\ txtPlot(B) \end{cases}$$



Π

Rotated

$Word(s, ap, an, fo) := \left| txtWord(s, ap, 0.4, 1, 1+i, i, an, 1, 4, fo, 0) \right.$

$$P := 6 + 3 \cdot i$$
$$A := Word(str1, P, 20\ deg, \Phi 00)$$
$$B := Word(str2, P, -20\ deg, \Phi 01)$$
$$\Pi := \begin{cases} txtPlot(A) \\ txtPlot(B) \\ augment(ReIm(P), "o") \end{cases}$$

Π

time

Fonts

Fonts **These two fonts are from "Creating amazing images with Mathcad", by Byrge Birkeland.**

$$\begin{bmatrix} 0 & 0 & 2 & 2 & 0 \\ 0 & -1 & -1 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0.5 & 0.5 & 0.5 & 1 & NaN & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 2 & 2 & 9 & 9 & 2 \\ 2 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 1 & 1 & 0 & 0 & 1 & NaN & 2 & 3 & 3 & 2 & 2 \\ 6 & 6 & 8 & 8 & 6 & 0 & 6 & 6 & 8 & 8 & 6 \end{bmatrix}$$
$$0000000000$$
$$\begin{bmatrix} 0 & 2 & 3 & 3 & 4 & 4 & 5 & 7 & 7 & 5 & 4 & 4 & 5 & 7 & 5 & 4 & 4 & 3 & 3 & 2 & 0 & 0 & 2 & 3 & 3 & 2 & 0 & 1 & NaN & 4 & 5 & 5 & 4 & 4 & 1 & NaN & 3 & 3 & 2 & 2 & 3 \\ 2 & 0 & 0 & -1 & -1 & 0 & 0 & 2 & 3 & 5 & 5 & 8 & 7 & 7 & 9 & 9 & 10 & 10 & 9 & 9 & 7 & 6 & 4 & 4 & 1 & 2 & 2 & 0 & 1 & 2 & 3 & 4 & 1 & 0 & 5 & 8 & 7 & 6 & 5 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & -1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & -1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 1 & 8 & 7 & 0 & 1 & NaN & 6 & 6 & 6 & 1 & NaN & 5.5 & 6.5 & 6.5 & 5.5 & 5.5 & 1 & NaN & 2 & 2 & 2 & 1 & NaN & 1.5 & 2.5 & 2.5 & 1.5 & 1.5 \\ 0 & 0 & 9 & 9 & 0 & 0 & 0 & 4 & 0 & 0 & 1 & 1 & 3 & 3 & 1 & 0 & 5 & 9 & 5 & 0 & 6 & 6 & 8 & 8 & 6 \\ 0 & 0 & 0 & 0 & 0 & 0 & 2 & 2 & 0 & 0 & 2 & 0 & 2 & 0 & 0 & 0 & 2 & 2 & 0 & 0 & 2 & 0 & 2 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 0 & 2 & 3 & 4.2 & 5 & 7 & 7 & 5.3333 & 4.8 & 7 & 7 & 4.4 & 2.8 & 5 & 1 & 1 & 1.8 & 0 & 1 & NaN & 1 & 1 & 2 & 3 & 3.8 & 2.2 & 1 & 1 & NaN & 2 & 2 & 2.4 & 4 & 2 \\ 3 & 2 & 0 & 0 & 1.2 & 0 & 0 & 1 & 1 & 1.8 & 4 & 5 & 2.4 & 4.8 & 7 & 7 & 6 & 4.8 & 3 & 0 & 3 & 2 & 1 & 1 & 1.8 & 4.2 & 3 & 0 & 7 & 6 & 5.4 & 7 & 7 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 0 & 0.5 & 1 & 0 & 0 \\ 4 & 4 & 6 & 6 & 4 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 2 & 3 & 3 & 2 & 2 & 3 & 3 & 2 & 0 & 0 \\ 0 & -2 & -2 & -1 & 0 & 9 & 10 & 11 & 11 & 9 & 0 \\ 1 & 0 & 0 & -1 & 0 & -1 & 0 & 0 & 1 & 0 & 1 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 1 & 3 & 3 & 1 & 0 & 0 & 1 & 1 & 0 & 0 \\ -2 & -2 & 0 & 9 & 11 & 11 & 10 & 9 & 0 & -1 & -2 \\ 0 & 1 & 0 & 1 & 0 & 0 & -1 & 0 & -1 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 2.5 & 2.5 & 3.5 & 3.5 & 6 & 6 & 3.75 & 6 & 6 & 3.5 & 3.5 & 2.5 & 2.5 & 0 & 0 & 2.25 & 0 & 0 \\ 1 & 2.6667 & 0 & 0 & 2.6667 & 1 & 2 & 3.5 & 5 & 6 & 4.3333 & 7 & 7 & 4.3333 & 6 & 5 & 3.5 & 2 & 1 \end{bmatrix}$$
$$\begin{bmatrix} 2 & 3 & 3 & 5 & 5 & 3 & 3 & 2 & 2 & 0 & 0 & 2 & 2 \\ 1 & 1 & 3 & 3 & 4 & 4 & 6 & 6 & 4 & 4 & 3 & 3 & 1 \end{bmatrix}$$
$$\begin{bmatrix} 0.5 & 1 & 1 & 0 & 0.5 \\ 0 & 0.5 & 0 & -0.5 & 0 \\ -3 & 0 & -1 & 1 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 3 & 3 & 0 & 0 \\ 3 & 3 & 4 & 4 & 3 \end{bmatrix}$$
$$\begin{bmatrix} 0.5 & 0.5 & 0.5 \\ 0 & 1 & 0 \\ 2 & 2 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 1 & 3 & 2 & 0 \\ 0 & 0 & 9 & 9 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 2 & 0 & 0 & 1 & NaN & 2 & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 \\ 2 & 0 & 0 & 2 & 7 & 9 & 9 & 7 & 2 & 0 & 2 & 7 & 8 & 8 & 7 & 2 & 1 & 1 & 2 \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 2 & 4 & 4 & 2 & 0 & 1 & 2 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 \\ 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 0 & 1 & NaN & 0 & 0 \\ 0 & 0.5 & 0 & 1 & 8 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 0 & 1 & NaN & 1 & 1 \\ 6 & 8 & 0 & 6 & 8 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 2 & 1 & NaN & 2 & 4 & 1 & NaN & 0.25 & 3.25 & 1 & NaN & 0.75 & 3.75 \\ 0 & 8 & 0 & 0 & 8 & 0 & 3 & 3 & 0 & 5 & 5 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 1 & 2 & 2 & 1 & 1 & 2 & 3 & 1 & NaN & 1.5 & 1.5 \\ 2 & 1 & 1 & 3 & 3 & 5 & 5 & 4 & 0 & 0 & 6 \\ 1 & 0 & 2 & 0 & -2 & 0 & -1 & 0 & 0 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 2 & 0 & 2 & 3 & 0 & 1 & NaN & 2 & 2 & 2 \\ 5 & 5 & 5 & 6 & 0 & 0 & 0 & 2 & 0 \\ 2 & 2 & 0 & 0 & 0 & 0 & 2 & 2 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 3 & 3 & 2 & 1 & 0 & 0 & 2 & 0 & 0 & 3 \\ 2 & 1 & 0 & 0 & 1 & 2 & 5 & 5 & 4 & 0 \\ 0 & -1 & 0 & -1 & 0 & 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 0 \\ 4 & 2.5 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 0 \\ 7 & -1 \\ 0.25 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 0 \\ 7 & -1 \\ -0.25 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 1.5 & 1.5 & 1 & NaN & 0 & 3 & 1 & NaN & 3 & 0 \\ 0 & 4 & 0 & 1 & 3 & 0 & 1 & 3 \end{bmatrix}$$
$$\begin{bmatrix} 1 & 1 & 1 & NaN & 0 & 2 \\ 1 & 3 & 0 & 2 & 2 \end{bmatrix}$$
$$\begin{bmatrix} 0.5 & 1 & 1 & 0 & 1 \\ -1 & -0.5 & 0.5 & 0.5 & 0.5 \\ 1 & 0 & 2 & 2 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 2 \\ 2 & 2 \end{bmatrix}$$
$$\begin{bmatrix} 0.5 & 0.5 & 0.5 \\ 0 & 1 & 0 \\ 2 & 2 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 2 \\ 0 & 4 \end{bmatrix}$$
$$\begin{bmatrix} 0 & 3 & 3 & 0 & 0 \\ 1.5 & 1.5 & 4.5 & 4.5 & 1.5 \\ 2 & 0 & 2 & 0 & 0 \end{bmatrix}$$
$$\begin{bmatrix} 0.75 & 0.75 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 9 & 9 & 7 & 7 & 8 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 7 & 7 & 2 & 2 & 3 & 5 & 7 & 7 & 5 & 2 & 0 & 2 & 3 & 4 & 5 & 5 & 4 & 2 & 0 & 0 \\ 0 & 0 & 1 & 1 & 3 & 4 & 4 & 6 & 7 & 9 & 9 & 7 & 7 & 8 & 8 & 7 & 6 & 5 & 5 & 3 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5.5 & 7 & 7 & 5 & 2 & 0 & 2 & 3 & 4 & 5 & 5 & 4 & 2 & 2 & 4 & 5 & 5 & 4 & 3 & 2 & 0 \\ 2 & 0 & 0 & 2 & 3 & 4.5 & 6 & 7 & 9 & 9 & 7 & 7 & 8 & 8 & 7 & 6 & 5 & 5 & 4 & 4 & 3 & 2 & 1 & 1 & 2 & 2 \\ 1 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 6 & 6 & 7 & 7 & 6 & 6 & 3 & 0 & 0 & 4 & 4 & 1 & \text{NaN} & 1 & 4 & 4 & 3.5 & 1 & 1 \\ 0 & 0 & 4 & 4 & 5 & 5 & 9 & 9 & 6 & 4 & 4 & 0 & 0 & 5 & 5 & 8 & 8 & 5.5 & 5 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 3 & 2 & 2 & 7 & 7 & 0 & 0 & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 & 0 \\ 2 & 0 & 0 & 2 & 4 & 6 & 6 & 5 & 8 & 8 & 9 & 9 & 4 & 4 & 5 & 5 & 4 & 2 & 1 & 1 & 2 & 2 \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 3 & 2 & 2 & 3 & 4 & 5 & 7 & 5 & 2 & 0 & 0 & 1 & \text{NaN} & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 & 2 \\ 2 & 0 & 0 & 2 & 4 & 6 & 6 & 5 & 7 & 8 & 8 & 7 & 7 & 9 & 9 & 7 & 2 & 0 & 2 & 1 & 1 & 2 & 4 & 5 & 5 & 4 & 2 & \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & -1 & 0 & -1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 1 & 3 & 7 & 7 & 0 & 0 & 2 & 2 & 5 & 5 & 1 \\ 0 & 0 & 6 & 9 & 9 & 7 & 7 & 8 & 8 & 6 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 5 & 2 & 2 & 0 & 0 & 1 & \text{NaN} & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 & 2 & 1 & \text{NaN} & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 & 2 \\ 2 & 0 & 0 & 2 & 3 & 5 & 9 & 9 & 5 & 3 & 2 & 0 & 2 & 1 & 1 & 2 & 3.5 & 4.5 & 4.5 & 3.5 & 2 & 0 & 6.5 & 5.5 & 5.5 & 5.5 & 6.5 & 7 & 8 & 8 & 7 & 6.6 \\ 1 & 0 & 1 & 0 & 1 & 2 & 0 & 2 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 2 & 0 & 0 & 2 & 4 & 5 & 5 & 4 & 3 & 2 & 0 & 1 & \text{NaN} & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 & 2 \\ 2 & 0 & 0 & 2 & 7 & 9 & 9 & 7 & 5 & 3 & 3 & 4 & 2 & 1 & 1 & 2 & 2 & 0 & 5 & 4 & 4 & 5 & 7 & 8 & 8 & 7 & 5 & \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & -1 & 0 & -1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0.5 & 0.5 & 0.5 & 1 & \text{NaN} & 0.5 & 0.5 & 0.5 \\ 0 & 1 & 0 & 0 & 5 & 6 & 5 & \\ 2 & 2 & 0 & 0 & 2 & 2 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0.5 & 1 & 1 & 0 & 0.5 & 1 & \text{NaN} & 0.5 & 0.5 & 0.5 \\ 0 & 0.5 & 0 & -0.5 & 0 & 0 & 5 & 6 & 5 & \\ -3 & 0 & -1 & 1 & 0 & 0 & 2 & 2 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 7 & 7 & 1.5 & 7 & 7 & 0 \\ 3.5 & 2.5 & 0 & 1 & 3 & 5 & 6 & 3.5 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 6 & 6 & 0 & 0 & 1 & \text{NaN} & 0 & 6 & 6 & 0 & 0 \\ 2 & 2 & 3 & 3 & 2 & 0 & 4 & 4 & 5 & 5 & 4 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 7 & 7 & 0 & 0 & 5.5 & 0 & 0 \\ 0 & 2.5 & 3.5 & 6 & 5 & 3 & 1 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 3.5 & 3.5 & 3.5 & 1 & \text{NaN} & 3 & 4 & 4 & 5 & 5 & 2 & 0 & 2 & 3 & 4 & 4 & 3 & 3 \\ 0 & 1 & 0 & 0 & 2 & 2 & 4 & 5 & 9 & 9 & 7 & 7 & 8 & 8 & 6 & 5 & 2 & \\ 2 & 2 & 0 & 0 & 0 & 0 & -1 & 2 & 0 & 1 & 2 & -1 & 0 & -2 & 1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 5 & 2 & 1 & 1 & 2 & 5 & 6 & 6 & 5 & 5 & 4 & 3 & 2 & 2 & 3 & 4 & 5 & 5 & 7 & 7 & 5 & 2 & 0 & 0 & 1 & \text{NaN} & 3 & 4 & 4 & 3 & 3 \\ 2 & 0 & 0 & 1 & 1 & 2 & 7 & 8 & 8 & 7 & 4 & 4 & 6 & 7 & 7 & 6 & 3 & 2 & 2 & 3 & 2.5 & 2.5 & 7 & 9 & 9 & 7 & 2 & 0 & 3.5 & 3.5 & 5.5 & 5.5 & 3.5 & \\ 1 & 0 & 2 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & -2 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 2 & 0 & 2 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2.67 & 5.33 & 6 & 7 & 4 & 3 & 0 & 1 & \text{NaN} & 3 & 5 & 4 & 3 \\ 0 & 0 & 2 & 2 & 0 & 0 & 9 & 9 & 0 & 0 & 3 & 3 & 6 & 3 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 5 & 7 & 7 & 5.5 & 7 & 7 & 5 & 0 & 0 & 1 & \text{NaN} & 2 & 2 & 4 & 5 & 5 & 4 & 2 & 1 & \text{NaN} & 2 & 2 & 4 & 5 & 5 & 4 & 2 \\ 0 & 0 & 2 & 3 & 4.5 & 6 & 7 & 9 & 9 & 0 & 0 & 1 & 4 & 4 & 3 & 2 & 1 & 1 & 0 & 5 & 8 & 8 & 7 & 6 & 5 & 5 & \\ 0 & 1 & 0 & 1 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 2 & 5 & 7 & 5 & 4 & 3 & 2 & 2 & 3 & 4 & 5 & 7 & 5 & 2 & 0 & 0 & 2 \\ 0 & 0 & 2 & 2 & 1 & 1 & 2 & 7 & 8 & 8 & 7 & 7 & 9 & 9 & 7 & 2 & 0 \\ 0 & 1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 5 & 7 & 7 & 5 & 0 & 0 & 1 & \text{NaN} & 2 & 2 & 4 & 5 & 5 & 4 & 2 \\ 0 & 0 & 2 & 7 & 9 & 9 & 0 & 0 & 1 & 8 & 8 & 7 & 2 & 1 & 1 & \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 7 & 7 & 2 & 2 & 4 & 4 & 2 & 2 & 7 & 7 & 0 & 0 \\ 0 & 0 & 1 & 1 & 4 & 4 & 5 & 5 & 8 & 8 & 9 & 9 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 4 & 4 & 2 & 2 & 7 & 7 & 0 & 0 \\ 0 & 0 & 4 & 4 & 5 & 5 & 8 & 8 & 9 & 9 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 5 & 7 & 7 & 4 & 4 & 5 & 5 & 4 & 3 & 2 & 2 & 3 & 4 & 5 & 7 & 5 & 2 & 0 & 0 & 2 \\ 0 & 0 & 2 & 4 & 4 & 3 & 3 & 2 & 1 & 1 & 2 & 7 & 8 & 8 & 7 & 7 & 9 & 9 & 7 & 2 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 5 & 5 & 7 & 7 & 5 & 5 & 2 & 0 & 0 \\ 0 & 0 & 4 & 4 & 0 & 0 & 9 & 9 & 5 & 5 & 9 & 9 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 0 & 0 \\ 0 & 0 & 9 & 9 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 5 & 4 & 3 & 2 & 0 \\ 2 & 0 & 0 & 2 & 9 & 9 & 2 & 1 & 1 & 2 & 2 \\ 1 & 0 & 1 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 5 & 7 & 3.5 & 7 & 5 & 2 & 2 & 0 & 0 \\ 0 & 0 & 4 & 0 & 0 & 4.5 & 9 & 9 & 5 & 9 & 9 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 7 & 7 & 2 & 2 & 0 & 0 \\ 0 & 0 & 1 & 1 & 9 & 9 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 4 & 6 & 6 & 8 & 8 & 6 & 4 & 2 & 0 & 0 \\ 0 & 0 & 6 & 3 & 6 & 0 & 0 & 9 & 9 & 6 & 9 & 9 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 6 & 8 & 8 & 6 & 6 & 2 & 0 & 0 \\ 0 & 0 & 7 & 0 & 0 & 9 & 9 & 2 & 9 & 9 & 0 \end{bmatrix}$$

$$\Phi 00 := \begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 5 & 2 & 0 & 0 & 1 & \text{NaN} & 2 & 2 & 3 & 4 & 5 & 5 & 4 & 3 & 2 \\ 2 & 0 & 0 & 2 & 7 & 9 & 9 & 7 & 2 & 0 & 2 & 7 & 8 & 8 & 7 & 2 & 1 & 1 & 2 & \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 5 & 7 & 7 & 5 & 0 & 0 & 1 & \text{NaN} & 2 & 2 & 4 & 5 & 5 & 4 & 2 \\ 0 & 0 & 4 & 4 & 6 & 7 & 9 & 9 & 0 & 0 & 5 & 8 & 8 & 7 & 6 & 5 & 5 & \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & 0 & & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 4 & 6 & 6 & 4 & 2 & 0 & 0 & 1 & \text{NaN} & 2 & 2 & 4 & 4 & 2 & 1 & \text{NaN} & 5.4142 & 6 & 7 & 7 & 5.7321 & 5.4142 \\ 2 & 0 & 0 & 2 & 7 & 9 & 9 & 7 & 2 & 0 & 2 & 7 & 7 & 2 & 2 & 0 & 0.5858 & 0 & 0 & 1 & 1 & 0.5858 & & \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & -2 & 0 & -2 & 0 & 0 & 0 & 0 & 0 & 0 & & & & & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 2 & 3 & 5 & 7 & 5 & 7 & 7 & 5 & 0 & 0 & 1 & \text{NaN} & 2 & 2 & 4 & 5 & 5 & 4 & 2 \\ 0 & 0 & 4 & 4 & 0 & 0 & 4 & 6 & 7 & 9 & 9 & 0 & 0 & 5 & 8 & 8 & 7 & 6 & 5 & 5 & \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & -1 & 0 & 0 & & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 5 & 7 & 7 & 6 & 3 & 2 & 2 & 3 & 4 & 5 & 7 & 5 & 2 & 0 & 0 & 2 & 4 & 5 & 5 & 4 & 3 & 2 & 0 \\ 2 & 0 & 0 & 2 & 4 & 5 & 5 & 6 & 7 & 8 & 8 & 7 & 7 & 9 & 9 & 7 & 6 & 4 & 4 & 3 & 2 & 1 & 1 & 2 & 2 \\ 1 & 0 & 1 & 0 & 1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 2.5 & 4.5 & 4.5 & 7 & 7 & 0 & 0 & 2.5 & 2.5 \\ 0 & 0 & 8 & 8 & 9 & 9 & 8 & 8 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 2 & 5 & 7 & 7 & 5 & 5 & 4 & 3 & 2 & 2 & 0 \\ 9 & 2 & 0 & 0 & 2 & 9 & 9 & 2 & 1 & 1 & 2 & 9 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 6 & 5.25 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 & 0 & 1.5 & 3 & 3 & 0 \\ 0 & 0 & 0.75 & 2.25 & 3.75 & 4.5 & 4.5 \\ 0 & 0 & -1 & 1 & 0 & 2 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 3 & 3 & 1.5 & 0.75 & 3 & 0 \\ 1.5 & 1.5 & 2.25 & 3.75 & 3.75 & 6 & 6 \\ 2 & 0 & 1 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 2.25 & 2.25 & 0 & 3 \\ 0 & 6 & 2.25 & 2.25 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 3 & 3 & 0 & 0 & 3 \\ 1.5 & 1.5 & 3 & 3 & 6 & 6 \\ 2 & 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 & 0 & 3 & 3 & 0 \\ 4.5 & 4.5 & 1.5 & 1.5 & 2.25 & 2.25 \\ 2 & 0 & 2 & 0 & 2 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 3 & 0 & 0 \\ 0 & 6 & 6 & 5.25 \end{bmatrix}$$

$$\begin{bmatrix} 1.5 & 1.5 & 1.5 & 1.5 & 1.5 \\ 0 & 3 & 6 & 3 & 0 \\ 2 & -2 & -2 & 2 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 & 0 & 3 & 3 & 0 \\ 3.75 & 3.75 & 4.5 & 4.5 & 1.5 & 1.5 \\ -2 & 0 & -2 & 0 & -2 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0.5 & 0.5 & 0.5 & 1 & \text{NaN} & 0.5 & 0.5 & 0.5 \\ 0 & 1 & 0 & 0 & 3 & 4 & 3 & \\ 2 & 2 & 0 & 0 & 2 & 2 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0.5 & 1 & 1 & 0 & 1 & 1 & \text{NaN} & 0.5 & 0.5 & 0.5 \\ -1 & -0.5 & 0.5 & 0.5 & 0.5 & 0 & 3 & 4 & 3 & \\ 1 & 0 & 2 & 2 & 0 & 0 & 2 & 2 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 2 & 0 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 1 & \text{NaN} & 0 & 2 \\ 1.5 & 1.5 & 0 & 2.5 & 2.5 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 0 \\ 1 & 2 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1.5 & 1.5 & 1.5 & 1 & \text{NaN} & 1.5 & 1.5 & 0 \\ 0 & 0.5 & 0 & 0 & 1 & 3 & 4.5 & \\ 2 & 2 & 0 & 0 & 0 & 3 & 0 & \end{bmatrix}$$

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

$$\begin{bmatrix} 0 & 1.5 & 3 & 1 & \text{NaN} & 0.375 & 2.625 \\ 0 & 6 & 0 & 0 & 1.5 & 1.5 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1.5 & 1.5 & 0 & 1.5 & 1.5 & 0 & 0 \\ 0 & 0 & 3 & 3 & 3 & 6 & 6 & 0 \\ 0 & 2 & 0 & 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 & 0 & 3 \\ 4.5 & 4.5 & 1.5 & 1.5 \\ 2 & 0 & 2 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1.5 & 3 & 3 & 1.5 & 0 & 0 \\ 0 & 0 & 1.5 & 4.5 & 6 & 6 & 0 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 & 0 & 3 & 1 & \text{NaN} & 0 & 1.5 \\ 0 & 0 & 6 & 6 & 0 & 3 & 3 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 3 & 1 & \text{NaN} & 0 & 1.5 \\ 0 & 6 & 6 & 0 & 3 & 3 & \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 & 0 & 3 & 3 & 1.5 \\ 4.5 & 4.5 & 1.5 & 1.5 & 3 & 3 \\ 2 & 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 & \text{NaN} & 3 & 3 & 1 & \text{NaN} & 0 & 3 \\ 0 & 6 & 0 & 0 & 6 & 0 & 3 & 3 & & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 \\ 0 & 6 \end{bmatrix}$$

$$\Phi 01 := \begin{bmatrix} 0 & 3 & 3 \\ 1.5 & 1.5 & 6 \\ 2 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 & \text{NaN} & 3 & 0 & 3 \\ 0 & 6 & 0 & 0 & 3 & 6 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 3 \\ 6 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1.5 & 3 & 3 \\ 0 & 6 & 3 & 6 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 3 & 3 \\ 0 & 6 & 0 & 6 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 3 & 3 & 0 & 0 \\ 1.5 & 1.5 & 4.5 & 4.5 & 1.5 \\ 2 & 0 & 2 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1.5 & 1.5 & 0 & 0 \\ 3 & 3 & 6 & 6 & 0 \\ 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$

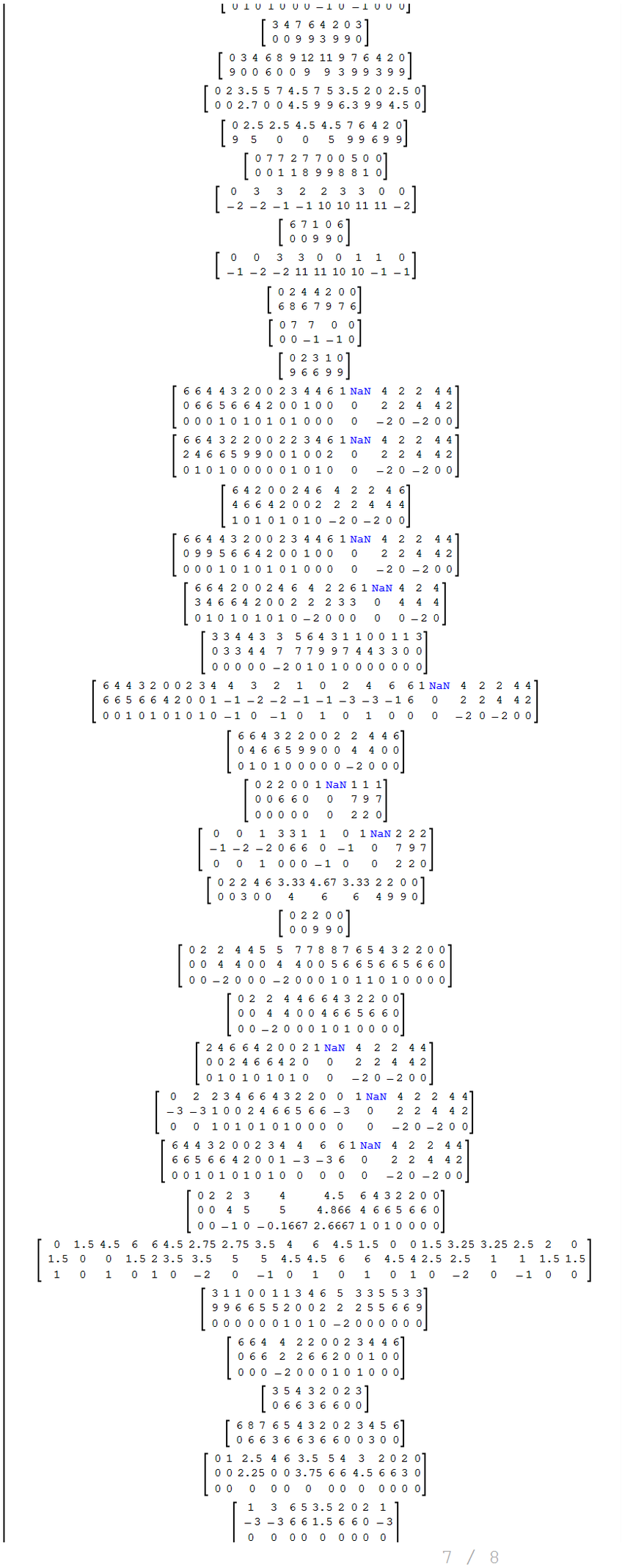
$$\begin{bmatrix} 0 & 3 & 3 & 0 & 0 & 1 & \text{NaN} & 2.25 & 3 & 3.75 \\ 1.5 & 1.5 & 4.5 & 4.5 & 1.5 & 0 & 0.75 & 0 & 0 & \\ 2 & 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1.5 & 1.5 & 0 & 0 & 1 & \text{NaN} & 1.5 & 3 \\ 3 & 3 & 6 & 6 & 0 & 0 & 3 & 0 & \\ 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1.5 & 3 \\ 1.5 & 3 & 4.5 \\ 3 & -3 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1.5 & 1.5 & 1 & \text{NaN} & 0 & 3 \\ 0 & 6 & 0 & 6 & 6 & \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 3 & 3 \\ 6 & 1.5 & 1.5 & 6 \end{bmatrix}$$



$$\begin{bmatrix} \begin{bmatrix} 0 & 6 & 6 & 2 & 6 & 6 & 0 & 0 & 4 & 0 & 0 \\ 0 & 0 & 1 & 1 & 5 & 6 & 6 & 5 & 5 & 1 & 0 \end{bmatrix} \\ \begin{bmatrix} 1 & 2 & 4 & 3 & 3 & 2 & 3 & 3 & 4 & 2 & 1 & 1 & 0 & 1 & 1 \\ -1 & -2 & -2 & -1 & 3.5 & 4.5 & 5.5 & 10 & 11 & 11 & 10 & 5.5 & 4.5 & 3.5 & -1 \\ 1 & 0 & -1 & 0 & 1 & 1 & 0 & -1 & 0 & 1 & 0 & -1 & -1 & 0 & 0 \end{bmatrix} \\ \begin{bmatrix} 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 9 & 9 & 0 \end{bmatrix} \\ \begin{bmatrix} 0 & 2 & 3 & 3 & 4 & 3 & 3 & 2 & 0 & 1 & 1 & 2 & 1 & 1 & 0 \\ -2 & -2 & -1 & 3.5 & 4.5 & 5.5 & 10 & 11 & 11 & 10 & 5.5 & 4.5 & 3.5 & -1 & -2 \\ 0 & 1 & 0 & -1 & -1 & 0 & 1 & 0 & -1 & 0 & 1 & 1 & 0 & -1 & 0 \end{bmatrix} \end{bmatrix} \quad \begin{bmatrix} \begin{bmatrix} 0 & 2 & 0 & 2 \\ 4 & 4 & 0 & 0 \end{bmatrix} \\ \begin{bmatrix} 1 & 0.5 & 0.5 & 0 & 0.5 & 0.5 & 1 \\ -0.5 & 0 & 2.5 & 3 & 3.5 & 6 & 6.5 \end{bmatrix} \\ \begin{bmatrix} 0 & 0 \\ 0 & 6 \end{bmatrix} \\ \begin{bmatrix} 0 & 0.5 & 0.5 & 1 & 0.5 & 0.5 & 0 \\ -0.5 & 0 & 2.5 & 3 & 3.5 & 6 & 6.5 \end{bmatrix} \end{bmatrix}$$

$$\Phi 00_4 := \begin{bmatrix} 1 & 2 & 2.2778 & 4.2778 & 4 & 5 & 5.2778 & 7 & 7 & 5.3889 & 5.6111 & 7 & 7 & 5.7222 & 6 \\ 0 & 0 & 2.5 & 2.5 & 0 & 0 & 2.5 & 2.5 & 3.5 & 3.5 & 5.5 & 5.5 & 6.5 & 6.5 & 9 \end{bmatrix}$$

$$\Phi 00_4 := \text{augment}\left(\Phi 00_4, \begin{bmatrix} 5 & 4.7222 & 2.7222 & 3 & 2 & 1.7222 & 0 & 0 & 1.6111 & 1.3889 & 0 & 0 & 1.2778 & 1 & 1 & \text{NaN} & 2.3889 & 4.3889 & 4.6111 & 2.6111 & 2.3889 \\ 9 & 6.5 & 6.5 & 9 & 9 & 6.5 & 6.5 & 5.5 & 5.5 & 3.5 & 3.5 & 2.5 & 2.5 & 0 & 0 & 3.5 & 3.5 & 5.5 & 5.5 & 3.5 \end{bmatrix}\right)$$

$$\Phi\_Str\_1 := \text{"\_!\"\#\$\%\&'()*+,-./0123456789:;<=>?@"}$$

$$\Phi\_Str\_2 := \text{"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]\^\_`"}$$

$$\Phi\_Str\_3 := \text{"abcdefghijklmnopqrstuvwxyz\{|\}"}$$

$$\Phi 00 := \text{stack}\left(\Phi 00, \text{concat}\left(\Phi\_Str\_1, \Phi\_Str\_2, \Phi\_Str\_3\right)\right) \qquad \Phi 01 := \text{stack}\left(\Phi 01, \text{concat}\left(\Phi\_Str\_1, \Phi\_Str\_2, \Phi\_Str\_3\right)\right)$$

Alvaro