```
[j 2 t  -3-2j]
[0 1 2j -1-j ]→matST
[s 0 4  1    ]

                                        [j 2 t   -3-2·j]
                                        [0 1 2·j -1-j  ]
                                        [s 0 4   1     ]
AVRank(matST,2,2)
                                                   done
matnew→matT1
                                           [j t-4·j -1]
                                           [s 4      1]
AVRank(matT1,1,1)
                                                   done
matnew→matT2
                                  [4·s+s·t·j+4 -s·j+1]
"If 4·s+s·t·j+4≠0 we have 3 exchange steps"
          "If 4·s+s·t·j+4≠0 we have 3 exchange steps"
"If -s·j+1≠0 we have 3 exchange steps too"
           "If -s·j+1≠0 we have 3 exchange steps too"
solve({4·s+s·t·j+4=0,-s·j+1=0},{s,t})
                                        {s=-j,t=-4+4·j}
"Thus we have for s=-j,t=-4+4·j: rank(A)=rank(A,-▸
    "Thus we have for s=-j,t=-4+4·j: rank(A)=rank(A,-▸
"now consider 4·s+s·t·j+4≠0 and s=-j"
                "now consider 4·s+s·t·j+4≠0 and s=-j"
4·s+s·t·j+4|s=-j
                                               t+4-4·j
"i.e. t≠-4+4·j"
                                       "i.e. t≠-4+4·j"
"Thus we have for s=-j and t≠-4+4·j: rank(A)=ranl▸
    "Thus we have for s=-j,t≠-4+4·j: rank(A)=rank(A,-▸
"now consider 4·s+s·t·j+4=0 and s≠-j"
                "now consider 4·s+s·t·j+4=0 and s≠-j"
"i.e. rank(A)=2<rank(A,-b)=3"
```

"i.e. rank(A)=2<rank(A,-b)=3"

"finally if 4·s+s·t·i+4≠0 and −s·i+1≠0: rank(A)=rar▸

"finally if 4·s+s·t·i+4≠0 and −s·i+1≠0: rank(A)=rar▸

"Now we consider the LinEqSys"

"Now we consider the LinEqSys"

LinEqSys(matST,2,2)

done

matnew→matT1

$$\begin{bmatrix} i & t-4\cdot i & -1 \\ 0 & -2\cdot i & 1+i \\ s & 4 & 1 \end{bmatrix}$$

LinEqSys(matT1,1,1)

done

matnew→matT2

$$\begin{bmatrix} t\cdot i+4 & -i \\ -2\cdot i & 1+i \\ 4\cdot s+s\cdot t\cdot i+4 & -s\cdot i+1 \end{bmatrix}$$

"If 4·s+s·t·i+4≠0 we have an unique solution"

"If 4·s+s·t·i+4≠0 we have an unique solution"

LinEqSys(matT2,3,1)

done

matnew→matET

$$\begin{bmatrix} \dfrac{-(t\cdot i+4+4\cdot i)}{4\cdot s+s\cdot t\cdot i+4} \\ \dfrac{-((1-i)\cdot s\cdot t+(-6-4\cdot i)\cdot s-4-6\cdot i)}{4\cdot s+s\cdot t\cdot i+4} \\ \dfrac{(s+i)\cdot i}{4\cdot s+s\cdot t\cdot i+4} \end{bmatrix}$$

"have a look on det(A):"

"have a look on det(A):"

$$\det\left(\begin{bmatrix} i & 2 & t \\ 0 & 1 & 2i \\ s & 0 & 4 \end{bmatrix}\right)$$

```
                                                   -s·t+4·s·𝑖+4·𝑖
factorOut(ans,𝑖)
                                                  (4·s+s·t·𝑖+4)·𝑖
"In case det(A)=0 and s=-𝑖, i.e. t=-4+4·𝑖, we hav▸
    "In case det(A)=0 and s=-𝑖, i.e. t=-4+4·𝑖, we hav▸
matT2|s=-𝑖 and t=-4+4·𝑖
```

$$\begin{bmatrix} -4\cdot i & -i \\ -2\cdot i & 1+i \\ 0 & 0 \end{bmatrix}$$

```
"solution: x=-4𝑖c-𝑖, y=-2𝑖c+1+𝑖, z=c, c∈C"
            "solution: x=-4𝑖c-𝑖, y=-2𝑖c+1+𝑖, z=c, c∈C"
□
```