In [77]:

```
B=matrix(Zmod(3),[[1,0,1],[0,1,1],[2,0,0],[2,1,2]]); show(A)
```

$$\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 2 & 0 & 0 \\ 2 & 1 & 2 \end{pmatrix}$$

In [78]:

```
B = block_matrix([[A,1]]); show(B)
```

$$\begin{pmatrix} 1 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 2 & 0 & 0 & 0 & 0 & 1 & 0 \\ 2 & 1 & 2 & 0 & 0 & 0 & 1 \end{pmatrix}$$

In [79]:

```
L = B.echelon_form(); show(L)
```

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 2 & 0 \\ 0 & 1 & 0 & 0 & 2 & 1 & 2 \\ 0 & 0 & 1 & 0 & 2 & 2 & 1 \\ 0 & 0 & 0 & 1 & 1 & 2 & 2 \end{pmatrix}$$

In [80]:

```
L=copy(L)
```

In [81]:

```
L.subdivide([3],[3]); show(L)
```

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 2 & 0 \\ 0 & 1 & 0 & 0 & 2 & 1 & 2 \\ 0 & 0 & 1 & 0 & 2 & 2 & 1 \\ 0 & 0 & 0 & 1 & 1 & 2 & 2 \end{pmatrix}$$

In [82]:

```
A=L.subdivision(0,1); show(A)
```

$$\begin{pmatrix} 0 & 0 & 2 & 0 \\ 0 & 2 & 1 & 2 \\ 0 & 2 & 2 & 1 \end{pmatrix}$$

In [73]:

```
J=PolynomialRing(Zmod(3),3,"c")
```

In [74]:

```
J.gens()
```

Out[74]:

```
(c0, c1, c2)
```

In [85]:

```
C=matrix(J,3,1,J.gens()); show(C)
```

$$\begin{pmatrix} c_0 \\ c_1 \\ c_2 \end{pmatrix}$$

In [75]:

```
H=C.subdivision(1,1); show(H)
```

$$\begin{pmatrix} 1 & 1 & 2 & 2 \end{pmatrix}$$

In [86]:

```
show(A+C*H)
```

$$\begin{pmatrix} c_0 & c_0 & -c_0+2 & -c_0 \\ c_1 & c_1+2 & -c_1+1 & -c_1+2 \\ c_2 & c_2+2 & -c_2+2 & -c_2+1 \end{pmatrix}$$

In [ ]:

```

```