```
> restart;
> LHS:=x[1]*<3,8,0>+x[2]*<0,0,2>:
  RHS:=x[3]*<1,0,2>+x[4]*<0,2,1>:
  eq:=LHS-RHS;
```

$$eq := \begin{bmatrix} 3\,x_1 - x_3 \\ 8\,x_1 - 2\,x_4 \\ 2\,x_2 - 2\,x_3 - x_4 \end{bmatrix} \tag{1}$$

```
> EQS:=convert(eq,list);
```

$$EQS := [3\,x_1 - x_3,\ 8\,x_1 - 2\,x_4,\ 2\,x_2 - 2\,x_3 - x_4] \tag{2}$$

```
> with(LinearAlgebra):
> var:=[x[1],x[2],x[3],x[4]];
```

$$var := [x_1, x_2, x_3, x_4] \tag{3}$$

```
> A,b:=GenerateMatrix(EQS,var);
```

$$A, b := \begin{bmatrix} 3 & 0 & -1 & 0 \\ 8 & 0 & 0 & -2 \\ 0 & 2 & -2 & -1 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \tag{4}$$

```
> LinearSolve(A,b,free=t);
```

$$\begin{bmatrix} t_1 \\ 5\,t_1 \\ 3\,t_1 \\ 4\,t_1 \end{bmatrix} \tag{5}$$

```
> convert(A,listlist);
```

$$[[3, 0, -1, 0], [8, 0, 0, -2], [0, 2, -2, -1]] \tag{6}$$

```
> # Shortest solution using equations from scratch
> B:=Matrix([[3, 0, -1, 0], [8, 0, 0, -2], [0, 2, -2, -1]]);
  LinearSolve(B,<0,0,0>,free=s);
```

$$B := \begin{bmatrix} 3 & 0 & -1 & 0 \\ 8 & 0 & 0 & -2 \\ 0 & 2 & -2 & -1 \end{bmatrix}$$

$$\begin{bmatrix} s_1 \\ 5\,s_1 \\ 3\,s_1 \\ 4\,s_1 \end{bmatrix} \tag{7}$$