

Homework 08 demo:

Problem 1(b), page 229:

```
> T := (x1,x2,x3)->Vector([x1+x2+x3,x2-x3]);  
      T := (x1, x2, x3) → Vector([x1 + x2 + x3, x2 - x3]) (1)
```

```
> C := <<-1,1>|<1,1>>; # the basis for W  
      C :=  $\begin{bmatrix} -1 & 1 \\ 1 & 1 \end{bmatrix}$  (2)
```

```
> A := Matrix(2,3): # open the matrix  
> A[1..-1,1] := LinearAlgebra:-LinearSolve(C,T(1,1,0));  
      A1..-1,1 :=  $\begin{bmatrix} -\frac{1}{2} \\ \frac{3}{2} \end{bmatrix}$  (3)
```

```
> A[1..-1,2] := LinearAlgebra:-LinearSolve(C,T(0,1,1));  
      A1..-1,2 :=  $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$  (4)
```

```
> A[1..-1,3] := LinearAlgebra:-LinearSolve(C,T(1,0,1));  
      A1..-1,3 :=  $\begin{bmatrix} -\frac{3}{2} \\ \frac{1}{2} \end{bmatrix}$  (5)
```

```
> A;  
       $\begin{bmatrix} -\frac{1}{2} & -1 & -\frac{3}{2} \\ \frac{3}{2} & 1 & \frac{1}{2} \end{bmatrix}$  (6)
```

```
>
```

Problem 3, page 230

```
> S := (x1,x2,x3)-> Vector([x1+x2,x2+x3,x3+x1,x1+x2+x3]);  
      S := (x1, x2, x3) → Vector([x1 + x2, x2 + x3, x3 + x1, x1 + x2 + x3]) (7)
```

```
> A := Matrix(4,3):  
> A[1..-1,1] := S(1,1,0):  
      A[1..-1,2] := S(0,1,1):
```

```

A[1..-1,3] := S(1,0,1):
> A;

```

$$A := \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \\ 2 & 2 & 2 \end{bmatrix}$$

(8)

Problem 4(c), page 231

```

> A := <<3,-1>|<-3,1>|<1,0>>;

```

$$A := \begin{bmatrix} 3 & -3 & 1 \\ -1 & 1 & 0 \end{bmatrix}$$

(9)

```

> B := <<1,1,1>|<1,1,0>|<0,1,1>>;

```

$$B := \begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

(10)

```

> C := <<1,1>|<-1,-2>>;

```

$$C := \begin{bmatrix} 1 & -1 \\ 1 & -2 \end{bmatrix}$$

(11)

```

> u := LinearAlgebra:-LinearSolve(B,<x[1],x[2],x[3]>);

```

$$u := \begin{bmatrix} -x_2 + x_3 + x_1 \\ x_2 - x_3 \\ -x_1 + x_2 \end{bmatrix}$$

(12)

```

> v := A.u;

```

$$v := \begin{bmatrix} -5x_2 + 6x_3 + 2x_1 \\ 2x_2 - 2x_3 - x_1 \end{bmatrix}$$

(13)

```

> w := C.v;

```

$$w := \begin{bmatrix} -7x_2 + 8x_3 + 3x_1 \\ -9x_2 + 10x_3 + 4x_1 \end{bmatrix}$$

(14)