```
> restart;
> with( LinearAlgebra ):
```

Define the consumption matrix, C. Note how this is formed as three column vectors; commas move to a new row and vertical struts move to a new column.

```
> C := < < .1, .3, .3> | <.6, .2, .1> | <.6, 0, .1> >;
```

$$C := \begin{bmatrix} 0.1 & 0.6 & 0.6 \\ 0.3 & 0.2 & 0 \\ 0.3 & 0.1 & 0.1 \end{bmatrix} \qquad \textbf{(1)}$$

The 3x3 identity matrix

```
> I3 := IdentityMatrix(3);
```

$$I3 := \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \qquad \textbf{(2)}$$

The final demand vector

```
> d := <0,18,0>;
```

$$d := \begin{bmatrix} 0 \\ 18 \\ 0 \end{bmatrix} \qquad \textbf{(3)}$$

Intermediate demand

```
> d1 := C . d + d;
```

$$d1 := \begin{bmatrix} 10.7999999999999990 \\ 21.6000000000000014 \\ 1.80000000000000004 \end{bmatrix} \qquad \textbf{(4)}$$

and the next few intermediate demands

```
> d2 := C . d1 + d;
```

$$d2 := \begin{bmatrix} 15.1200000000000010 \\ 25.5600000000000024 \\ 5.58000000000000008 \end{bmatrix} \qquad \textbf{(5)}$$

```
> d3 := C . d2 + d;
```

(6)

$$d3 := \begin{bmatrix} 20.1959999999999980 \\ 27.6480000000000034 \\ 7.65000000000000036 \end{bmatrix} \tag{6}$$

```
> d4 := C . d3 + d;
```

$$d4 := \begin{bmatrix} 23.1984000000000030 \\ 29.5884000000000000 \\ 9.58859999999999956 \end{bmatrix} \tag{7}$$

Or, in a loop:

```
> u := d;
> for k from 1 to 4 do
>   u := C . u + d;
> end do;
```

$$u := \begin{bmatrix} 0 \\ 18 \\ 0 \end{bmatrix}$$

$$u := \begin{bmatrix} 10.7999999999999990 \\ 21.6000000000000014 \\ 1.80000000000000004 \end{bmatrix}$$

$$u := \begin{bmatrix} 15.1200000000000010 \\ 25.5600000000000024 \\ 5.58000000000000008 \end{bmatrix}$$

$$u := \begin{bmatrix} 20.1959999999999980 \\ 27.6480000000000034 \\ 7.65000000000000036 \end{bmatrix}$$

$$u := \begin{bmatrix} 23.1984000000000030 \\ 29.5884000000000000 \\ 9.58859999999999956 \end{bmatrix} \tag{8}$$

How many iterations are needed before these estimates settle down to 2 decimal places?

The problem can also be solved by finding the inverse:

```
> Ainv := MatrixInverse( I3-C );
```

(9)

$$Ainv := \begin{bmatrix} 2.22222222222222188 & 1.85185185185185142 & 1.48148148148148118 \\ 0.833333333333333148 & 1.94444444444444420 & 0.555555555555555358 \\ 0.833333333333333148 & 0.833333333333333148 & 1.66666666666666652 \end{bmatrix} \tag{9}$$

```
> Ainv . d;
```

$$\begin{bmatrix} 33.3333333333333286 \\ 34.9999999999999930 \\ 14.9999999999999964 \end{bmatrix} \tag{10}$$

The same outline can be used for other problems. For extra credit, submit solutions to Exercises 13, 14, and 15 on p. 157 of the text by Friday, February 26.