

## Chapter 2 Homework Solutions

Compiled by Joe Kahlig

1. (a)  $A = \begin{bmatrix} 0.3 & 0.2 \\ 0.4 & 0.3 \end{bmatrix}$

(b) 8600 units of A  
9600 units of B

(c) 4500 units of A  
6320 units of B

(d) The need to increase production of A by 1.70731 units and production of B by 0.9756 units.

2. (a)  $A = \begin{bmatrix} 0.3 & 0.5 \\ 0.1 & 0.1 \end{bmatrix}$

(b) 12550 units of food  
8870 units of wood

(c) 8200 units of food  
2142 units of wood

(d) 1.552 units of food and 0.172 units of wood

(e) 2.586 units of food and 3.621 units of wood

3. (a)  $A = \begin{bmatrix} 0.3 & 0.2 & 0.2 \\ 0.2 & 0.1 & 0.3 \\ 0.1 & 0.2 & 0.3 \end{bmatrix}$

(b) 14 units of food  
21.4 units of cloth  
7.2 units of pottery

(c) 4620 units of food  
3400 units of cloth  
2600 units of pottery

(d) 84 units of food  
66 units of cloth  
69 units of pottery

(e) 0.531 units of food  
1.386 units of cloth  
0.472 units of pottery

(f) 3.540 units of food  
3.687 units of cloth  
8.702 units of pottery

4. (a) \$819.885 million of raw rubber  
\$851.272 million of tires  
\$145.104 million of other rubber goods

(b) \$619.885 million for raw rubber  
\$51.272 million for tires  
\$25.104 million for other rubber goods

5. (a) \$4,434.78 of food  
\$1,572.46 of cloth  
\$1905.80 of wood

(b) \$3490 of food  
\$490 of cloth  
\$1570 of wood

6. (a)  $A = \begin{bmatrix} 0.2 & 0 & 0.4 \\ 0 & 0.1 & 0.2 \\ 0.4 & 0.2 & 0.2 \end{bmatrix}$

(b)  $D = \begin{bmatrix} 40 \\ 25 \\ 50 \end{bmatrix}$

now plug into the formula  $X = (I - A)^{-1} * D$

$$X = \begin{bmatrix} 118 \\ 58 \\ 136 \end{bmatrix}$$

\$118 billion for coal

\$58 billion for oil

\$136 billion for transportation

(c)  $X = \begin{bmatrix} 120 \\ 60 \\ 190 \end{bmatrix}$

amount used by the production process is

$$AX = \begin{bmatrix} 100 \\ 44 \\ 98 \end{bmatrix}$$

\$100 billion for coal

\$44 billion for oil

\$98 billion for transportation

The amount remaining for consumer demands is

\$20 billion for coal

\$16 billion for oil

\$92 billion for transportation

7. Create  $[I - A|0] = \begin{array}{ccc|c} & 0.9 & -0.4 & -0.1 & 0 \\ & -0.7 & 0.4 & -0.2 & 0 \\ & -0.2 & 0 & 0.3 & 0 \end{array}$

doing rref gives

$$\begin{array}{ccc|c} 1 & 0 & -1.5 & 0 \\ 0 & 1 & -3.125 & 0 \\ 0 & 0 & 0 & 0 \end{array}$$

parametric solution:

$$R = 1.5E$$

$$T = 3.125E$$

$E$  = number of units of E produced in the economy.

8. parametric solution:

$$F = 2W$$

$$C = 0.5W$$

$W$  = number of units of wood produced in the economy.

9. parametric solution:

$$F = 1.5W$$

$$C = W$$

$W$  = number of units of wood produced in the economy.

since  $W = 7$  units, this gives  $F = 10.5$  units and  $C = 7$  units.

10. (a) 150 product A  
75 product B  
30 product C  
40 product D  
25 product E
- (b)  $815 - 75 = 740$  used internally in the production.
- (c) 360 product A  
330 product B  
77 product C  
45 product D  
10 product E