

Further Mathematics Units 3 & 4

Cambridge Senior Further Mathematics AC/VCE Units 3 & 4
 Chapters 13 Revision: Matrices: **Assignment**

- 1 The table below lists the number of TVs, computers, refrigerators, washing machines and dryers owned by five households.

Household	Number					Total cost
	TV	Computer	Refrigerator	Washing machine	Dryer	
A	3	2	1	1	1	\$6030
B	1	0	1	1	0	\$1930
C	2	4	2	1	1	\$9680
D	1	3	1	0	0	\$5850
E	0	2	1	0	0	\$4730

Let

- t be the average price paid for a TV by the households
- c be the average price paid for a computer by the households
- r be the average price paid for a refrigerator by the households
- w be the average price paid for a washing machine by the households
- d be the average price paid for a dryer by the households

then the average cost of each item can be determined by solving the following system of equations:

$$3t + 2c + r + w + d = 6030 \quad \text{Household A}$$

$$t + r + w = 1930 \quad \text{Household B}$$

$$2t + 4c + 2r + w + d = 9680 \quad \text{Household C}$$

$$t + 3c + r = 5850 \quad \text{Household D}$$

$$2c + r + w = 4730 \quad \text{Household E}$$

- Write the system of equations in matrix form.
- Use matrix methods to solve the system of equations to find the average price paid for each of the items.

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- 2** A car rental firm has four branches, one in each of Adelaide, Canberra, Melbourne and Sydney. Cars are usually rented and returned in the same city. However, a percentage of cars is rented in one city and returned in another.

Experience has shown that, from week to week:

- 66% of cars rented each week in Adelaide are returned to Adelaide.
- 9% of cars rented each week in Adelaide are returned to Canberra.
- 13% of cars rented each week in Adelaide are returned to Melbourne.
- 12% of cars rented each week in Adelaide are returned to Sydney.

- 84% of cars rented each week in Canberra are returned to Canberra.
- 4% of cars rented each week in Canberra are returned to Adelaide.
- 8% of cars rented each week in Canberra are returned to Melbourne.
- 4% of cars rented each week in Canberra are returned to Sydney.

- 77% of cars rented each week in Melbourne are returned to Melbourne.
- 4% of cars rented each week in Melbourne are returned to Adelaide .
- 15% of cars rented each week in Melbourne are returned to Canberra.
- 4% of cars rented each week in Melbourne are returned to Sydney.

- 76% of cars rented each week in Sydney are returned to Sydney.
- 8% of cars rented each week in Sydney are returned to Adelaide.
- 9% of cars rented each week in Sydney are returned to Canberra.
- 7% of cars rented each week in Sydney are returned to Melbourne.

- a** Construct and write down a transition matrix based on this information.
- b** One hundred new cars are added to the fleet in the first week of January. Each city is sent the same number of new cars. Construct and write down an appropriate column matrix to display this information.
- c** Determine where the one hundred new cars will end up:
- i** after one week
 - ii** after 6 weeks
 - iii** in the long term. Correct to one decimal place, how many weeks does it take to reach this steady state?