Hwa Chong Institution 华侨中学
Mathematics (SMTP)

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MA302.5.E1 - Matrices Exercise

1. The price lists for some computer parts from three electronics shops are as follows.

	Storage Disk	Memory	CPU	Software
Shop *A*	\$120	\$80	\$350	\$160
Shop *B*	\$100	\$85	\$320	\$180
Shop *C*	\$120	\$60	\$300	\$200

Shawn needs to purchase 5 storage disks, 10 pieces of memory sticks, 4 CPU chips and 8 sets of software for his laboratory project. Using a **matrix method**, determine which shop he should patronise in order to spend the least. Show all your working clearly.

2. A factory produces two types of toys – automated and clockwork. The following table shows the cost of the components used in producing each toy.

	Labour (hours)	Material (boxes)	Electricity (units)
Automated	7	5	0.5
Clockwork	4	3	0.3

(a) Represent the information given in the table as a 2×3 matrix **P**.

Labour costs \$6 per hour, the material used costs \$1 per box and electricity costs 22 cents per unit.

(b) (i) Represent this information as a column matrix **C**.

(ii) Evaluate **PC**.

(iii) Explain what the elements in **PC** represent.

(c) (i) If $\mathbf{X} = \begin{pmatrix} 2800 & 3200 \end{pmatrix}$, evaluate **XPC**.

(ii) Explain what **XPC** represent.

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1. Cost of products $= \begin{bmatrix} 120 \\ 100 \\ 120 \end{bmatrix} \times 5 + \begin{bmatrix} 80 \\ 85 \\ 60 \end{bmatrix} \times 10 + \begin{bmatrix} 350 \\ 320 \\ 300 \end{bmatrix} \times 4 + \begin{bmatrix} 160 \\ 180 \\ 200 \end{bmatrix} \times 8$

$= \begin{bmatrix} 600 \\ 500 \\ 600 \end{bmatrix} + \begin{bmatrix} 800 \\ 850 \\ 600 \end{bmatrix} + \begin{bmatrix} 1400 \\ 1280 \\ 1200 \end{bmatrix} + \begin{bmatrix} 1280 \\ 1440 \\ 1600 \end{bmatrix}$

$= \begin{bmatrix} 4080 \\ 4070 \\ 4000 \end{bmatrix}$ ✓

we write kA as a scalar multiple, not Ak.

Please use (·) not [·]

He should go to Shop C. ✓

2. (a) $P = \begin{bmatrix} 7 & 5 & 0.5 \\ 4 & 3 & 0.3 \end{bmatrix}$ ✓

(b) (i) $C = \begin{bmatrix} 6 \\ 1 \\ 0.22 \end{bmatrix}$ ✓

(ii) $PC = \begin{bmatrix} 7 & 5 & 0.5 \\ 4 & 3 & 0.3 \end{bmatrix} \begin{bmatrix} 6 \\ 1 \\ 0.22 \end{bmatrix}$

$= \begin{bmatrix} 47.11 \\ 27.066 \end{bmatrix}$ ✓

(iii) The elements represent the total cost of production of both methods. ? ✗ the unit cost, in dollars, of producing each type of toy.

(c) (i) $XPC = \begin{bmatrix} 2800 & 3200 \end{bmatrix} \begin{bmatrix} 47.11 \\ 27.066 \end{bmatrix}$

$= \begin{bmatrix} 218519.2 \end{bmatrix}$ ✓

(ii) The total amount of money spent. for ? producing 2800 automated and 3200 clockwork toys.

When you are asked to "explain", be clear.

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