

19. It is given that $M = \begin{pmatrix} 5 & 2 \\ 1 & -3 \end{pmatrix}$ and $N = \begin{pmatrix} -3 & 6 \\ 2 & -1 \\ -4 & 5 \end{pmatrix}$.

- (a) Compute
 (i) M^2 ,
 (ii) NM^2 .
 (b) Find the matrix
 (i) R if $N + R = NM^2$,
 (ii) S if $NM^2 + \frac{1}{3}S = N$.

20. Let $A = \begin{pmatrix} 1 & 4 \\ 3 & -2 \end{pmatrix}$, $B = \begin{pmatrix} 4 & -2 \\ -6 & 4 \end{pmatrix}$, $C = \begin{pmatrix} 3 & -4 & 2 \\ 0 & -1 & 5 \end{pmatrix}$ and $D = \begin{pmatrix} -1 \\ 11 \end{pmatrix}$.

- (a) Evaluate
 (i) $\frac{2}{3}(B - A)A$,
 (ii) $\left(\frac{1}{2}B + A\right)C$.
 (b) (i) Write down the order of the matrix P if $AP = D$.
 (ii) Find the matrix P .

21. (a) Compute A^2 , A^3 and A^4 if $A = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$.

- (b) Use your answers in (a) to deduce an expression for the matrix A^n , where n is a positive integer.
 (c) Use your answer in (b) to
 (i) compute the matrices A^8 and A^{11} ,
 (ii) find the value of k if the matrix $A^k = \begin{pmatrix} 1 & 32 \\ 0 & 1 \end{pmatrix}$.

22. A confectionery sells small, medium and large strawberry cakes and chocolate cakes. The number of each type of cake that was sold in a particular week are summarised in the following table.

	Chocolate	Strawberry
Small	10	12
Medium	18	17
Large	15	24

- (a) Represent the data in the above table by a 3×2 matrix N .
 (b) The prices of each small, medium and large cakes are \$8, \$15 and \$20 respectively and the matrix $P = \begin{pmatrix} 8 & 15 & 20 \end{pmatrix}$ can represent the information.
 (i) Compute PN and interpret the elements in PN .
 (ii) Let $W = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$. Compute PNW and interpret the result.