Matrices 1

1. Calculate (a) AB (b) BC (c) CA (d) C^{-1}

where $A=\begin{pmatrix}1 & 2 & -1\\ 3 & 0 & 5\end{pmatrix}$, $B=\begin{pmatrix}2 & -1\\ 2 & 1\\ 0 & 1\end{pmatrix}$ and $C=\begin{pmatrix}3 & 2\\ 1 & 3\end{pmatrix}$.

2. Use the matrix method to solve the equations

$5x + 4y = 20$
$7x + 6y = 26$

3. A is a square matrix for which $A^2 = 3A + 5I$.

a) Find A^3 in the form $pA + qI$.
b) Find A^{-1} in the form $pA + qI$.

4. $A = \begin{pmatrix}\lambda & 2\\ 3\lambda & 2\lambda\end{pmatrix}$

Find the values of λ for which the matrix A is singular.

5. A matrix $B = \begin{pmatrix}2 & 1\\ -1 & 0\end{pmatrix}$.

Prove by induction that $B^n = \begin{pmatrix}n+1 & n\\ -n & 1-n\end{pmatrix}$.