

DETERMINANT AND INVERSE OF 2X2 MATRICES ANSWER SHEET

Exercise 1:

a) $(3 \times 5) - (2 \times 2) = 11$

b) $(6 \times 10) - (3 \times 2) = 54$

c) $(10 \times 1) - (5 \times 1) = 5$

d) $(5 \times 5) - (5 \times 4) = 5$

e) $(4 \times 2) - (10 \times 1) = -2$

f) $(8 \times 3) - (10 \times 3) = -6$

Exercise 2:

a) $\frac{1}{11} \begin{pmatrix} 5 & -2 \\ -2 & 3 \end{pmatrix} = \begin{pmatrix} \frac{5}{11} & \frac{-2}{11} \\ \frac{-2}{11} & \frac{3}{11} \end{pmatrix}$

b) $\frac{1}{54} \begin{pmatrix} 10 & -3 \\ -2 & 6 \end{pmatrix} = \begin{pmatrix} \frac{10}{54} & \frac{-3}{54} \\ \frac{-2}{54} & \frac{6}{54} \end{pmatrix}$

c) $\frac{1}{5} \begin{pmatrix} 1 & -5 \\ -1 & 10 \end{pmatrix} = \begin{pmatrix} \frac{1}{5} & \frac{-5}{5} \\ \frac{-1}{5} & \frac{10}{5} \end{pmatrix} = \begin{pmatrix} \frac{1}{5} & -1 \\ \frac{-1}{5} & 2 \end{pmatrix} = \begin{pmatrix} \frac{10}{54} & \frac{-1}{18} \\ \frac{-1}{27} & \frac{1}{9} \end{pmatrix}$

d) $\frac{1}{5} \begin{pmatrix} 5 & -5 \\ -4 & 5 \end{pmatrix} = \begin{pmatrix} \frac{5}{5} & \frac{-5}{5} \\ \frac{-4}{5} & \frac{5}{5} \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ \frac{-4}{5} & 1 \end{pmatrix}$

e) $\frac{1}{-2} \begin{pmatrix} 2 & -10 \\ -1 & 4 \end{pmatrix} = \begin{pmatrix} \frac{2}{-2} & \frac{-10}{-2} \\ \frac{-1}{-2} & \frac{4}{-2} \end{pmatrix} = \begin{pmatrix} -1 & 5 \\ \frac{1}{2} & -2 \end{pmatrix}$

f) $\frac{1}{-6} \begin{pmatrix} 3 & -10 \\ -3 & 8 \end{pmatrix} = \begin{pmatrix} \frac{3}{-6} & \frac{-10}{-6} \\ \frac{-3}{-6} & \frac{8}{-6} \end{pmatrix} = \begin{pmatrix} \frac{-1}{3} & \frac{5}{3} \\ \frac{1}{3} & \frac{-4}{3} \end{pmatrix}$

Exercise 3:

a) $(1 \times 1) - (1 \times 1) = 0$

b) $(7 \times 1) - (2 \times 3) = 1$

c) $(20 \times 1) - (4 \times 5) = 0$

d) $(30 \times 2) - (15 \times 4) = 0$

a, c, d are all 0 so the matrices are 'singular'. this means you cannot find the inverse of the matrix as it doesn't have one.

Exercise 4:

a) $\frac{1}{43} \begin{pmatrix} 7 & -2 \\ -3 & 7 \end{pmatrix} = \begin{pmatrix} \frac{7}{43} & \frac{-2}{43} \\ \frac{-3}{43} & \frac{7}{43} \end{pmatrix}$

b) $\frac{1}{45} \begin{pmatrix} 9 & -3 \\ -3 & 6 \end{pmatrix} = \begin{pmatrix} \frac{9}{45} & \frac{-3}{45} \\ \frac{-3}{45} & \frac{6}{45} \end{pmatrix} = \begin{pmatrix} \frac{1}{5} & \frac{-1}{15} \\ \frac{-1}{15} & \frac{2}{15} \end{pmatrix}$

c) $\frac{1}{4} \begin{pmatrix} 4 & -6 \\ -6 & 10 \end{pmatrix} = \begin{pmatrix} \frac{4}{4} & \frac{-6}{4} \\ \frac{-6}{4} & \frac{10}{4} \end{pmatrix} = \begin{pmatrix} 1 & \frac{-3}{2} \\ \frac{-3}{2} & \frac{5}{2} \end{pmatrix}$