Test - Inverse matrices and systems of equations

Year: Further Maths · Duration: 60 minutes · /20

Name:	Date:	**Mark: /20**

Question	1	2	3	4	5	Total
marks	4	5	4	4	3	**20**
Mark						

Show your working.

Question 1 (4 marks)

Question 1 – A 2 by 2 system

(a) Find the inverse of $\mathbf{A} = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$. [2]

(b) Hence solve $2x + 3y = 5$ and $x + 4y = 0$. [2]

Question 2 (5 marks)

Question 2 – A 3 by 3 inverse

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a. Show that $\det \mathbf{A} = 13$. [1]
b. Find $\mathbf{A}^{-1}$. [3]

c. Use $\mathbf{A}^{-1}$ to solve . [1]

Question 3 (4 marks)

Question 3 – Consistency

The system is $x + y + z = 2$, $2x + y + 3z = 5$, $3x + 2y + 4z = k$.

a. Show that the system has no unique solution for any value of k. [1]
b. Find the value of k for which the equations are consistent. [1]
c. For that value of k, find the general solution. [2]

Question 4 (4 marks)

Question 4 – Geometry of three planes

The planes are Π_1: $x + 2y - z = 1$, Π_2: $2x + 4y - 2z = 5$ and Π_3: $x - y + z = 0$.

a. Show that Π_1 and Π_2 are parallel and not the same plane. [2]
b. Explain why the three planes have no common point, and describe the arrangement. [2]

Question 5 (3 marks)

Question 5 – Problem: buying fertiliser

Three bags of fertiliser A and two bags of fertiliser B cost £34. Two bags of A and five bags of B cost £52.

a. Write this as a matrix equation and find the inverse of the coefficient matrix. [2]
b. Find the price of one bag of each. [1]