Level 2 Further Maths: revision notes

Matrices

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Writing matrices

- A **matrix** is a rectangular array of numbers. Its **order** is rows × columns: a 2 × 2 **matrix** has 2 rows and 2 columns; a column vector is 2 × 1.
- In these notes, [2 1; 3 4] means the **matrix** with top row 2 1 and bottom row 3 4. [5; 6] is a **column vector** with 5 on top and 6 below.

Multiplying matrices

- Multiply each row of the first **matrix** by each column of the second: multiply matching entries and add.
- [2 1; 3 4] × [5; 6] = [2×5 + 1×6; 3×5 + 4×6] = [16; 39].
- [1 2; 3 4] × [0 1; 1 0] = [1×0 + 2×1, 1×1 + 2×0; 3×0 + 4×1, 3×1 + 4×0] = [2 1; 4 3].
- You can only multiply when the number of columns in the first equals the number of rows in the second. A 2 × 2 times a 2 × 1 gives a 2 × 1; a 2 × 1 times a 2 × 2 isn't possible.
- **Order** matters: in general, AB ≠ BA. A^2 means A × A.

The identity matrix and scalars

- The **identity matrix** I = [1 0; 0 1] leaves any **matrix** unchanged: AI = IA = A.
- To multiply by a number (a **scalar**), multiply every **entry**: 3 × [1 2; 0 –1] = [3 6; 0 –3].
- To find an unknown **entry**, multiply out and compare entries with the answer.

Key terms

Matrix	A rectangular array of numbers.
Order	The size of a matrix, given as rows × columns.
Column vector	A matrix with one column.

Your notes

Identity matrix	The matrix [1 0; 0 1], which leaves other matrices unchanged.
Scalar	A single number that multiplies every entry of a matrix.
Entry	One number in a matrix.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is the order of a matrix with 2 rows and 3 columns?
2. Work out [2 1; 3 4] × [5; 6].
3. What is the 2 × 2 identity matrix?
4. Is AB always equal to BA for matrices?
5. Work out 3 × [1 2; 0 –1].
6. Work out [1 2; 3 4] × [0 1; 1 0].
7. Can a 2 × 1 matrix be multiplied by a 2 × 2 matrix, in that order?
8. Work out $[2\ 0;\ 0\ 2]^2$.

Answers

1. 2 × 3
2. [16; 39]
3. [1 0; 0 1]
4. No
5. [3 6; 0 –3]
6. [2 1; 4 3]
7. No
8. [4 0; 0 4]

What to do next

Practise 10 questions on this topic

Try 3 exam questions, with mark schemes

Read the lesson, one step at a time

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Your notes