

# MA10210: ALGEBRA 1B

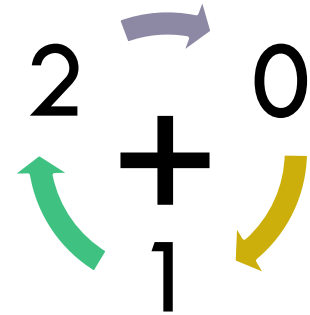
<http://people.bath.ac.uk/aik22/ma10210>

# Comments on Sheet 5

- When working in  $\mathbb{F}_3$ , make sure you really are working in  $\mathbb{F}_3$ :

- $-3 = 0 = 3; -2 = 1 = 4; -1 = 2 = 5$

- In particular, you can't divide by zero, even if it's disguised (e.g. as 3, -3)



- Confirming the basis using REF only works if you choose the furthest left of the suitable basis vectors.
  - (Other bases are available)

# Comments on Sheet 5

- Be careful working with infinite dimensional vector spaces:
  - ▣ a lot of the results in the course only apply to finite dimensional vector spaces
    - E.g. (3.2.3) – see proof
    - E.g. (2.4.2) – the definition of a basis is given in terms of  $v_1, \dots, v_n$
  - ▣ an infinite independent set is an infinite set in which every finite subset is independent.
    - which implies there is no finite maximal set, so no finite basis.

# Warm-up Questions

## □ Q1:

- Find a basis for the column space of  $\mathbf{A}$ .
- Find a basis for the row space of  $\mathbf{A}$ .
- Find  $\mathbf{B}$ ,  $\mathbf{C}$  such that  $\mathbf{A} = \mathbf{BC}$ .

## □ Q3

# Overview of Sheet 6

- Q2: similar to Q1
- Q4:
  - ▣ (i) consider  $\text{Im}(\psi \circ \phi) = \psi(\phi(U))$ , use result from Q3
  - ▣ (iii) uses result from Q3 also
- Q5:
  - ▣ (i) use standard matrix results, don't try to write out the whole matrix.
  - ▣ (ii) & (iii) start by doing the calculations, which should give you some idea where to go.