

Student Solutions For Honors Algebra (MATH10069) Past Papers

April 18, 2022

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Exam 2014-2015**Question 1****Q1a**

An example of infinite dimensional vector space over a field is $\mathbb{R}[x]$, the set of polynomials with coefficients in \mathbb{R} .

Q1b

An vector space with exactly 16 elements is $\mathbb{Z}/16\mathbb{Z} = \{0, 1, 2, \dots, 15\}$

Q1c**Question 2****Q2a**

To show that \mathcal{B} forms a basis, consider the matrix that represents \mathcal{B}

$$B = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}$$

using gaussian elimination we find that

$$rref(B) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

or that $\dim B = 3$ so \mathcal{B} spans $V = \mathbb{R}^3$

Q2b

i)

Denote the equivalence class $[v]$ for $v \in V$ by

$$[v] = \{v + u : u \in U\}$$

and addition and multiplication is defined as follows

$$k[n] = [kn]$$

for all $k \in \mathbb{R}$, and

$$[v_1] + [v_2] = [v_1 + v_2]$$

thus the canonical mapping is simply

$$can(v) : V \rightarrow V/U = [v]$$

and therefore $\ker can = 0$

Question 3**Question 4****Question 5**

Exam 2015-2016**Question 1****Question 2****Question 3****Question 4****Question 5**

Exam 2016-2017**Question 1****Question 2****Question 3****Question 4****Question 5**

Exam 2017-2018**Question 1****Question 2****Question 3****Question 4****Question 5**

Exam 2018-2019**Question 1****Question 2****Question 3****Question 4**

Exam 2019-2020**Question 1****Question 2****Question 3****Question 4**

Exam 2020-2021

Question 1

Question 2

Question 3