

MA3.101: Linear Algebra (Spring 2019)

Quiz 2

February 4, 2019

Time: Strictly 20 mins. Max. Marks: 10

Please Sit Apart. Do NOT copy, DO NOT refer to notes. If found doing so, you will get a zero.

1 Questions

1. (2.5+2.5 marks) Show that the following vectors are linearly independent or dependent.
 - (a) A function $f : \mathbb{R} \rightarrow \mathbb{R}$ is said to be periodic with period T if $f(t) = f(t+T)$, $\forall t \in \mathbb{R}$. Let V be the set of all continuous functions from \mathbb{R} to \mathbb{R} with all possible periods of the form nT , where n is any positive integer. Show that V is a vector space over \mathbb{R} .
 - (b) Show that this space cannot be finite dimensional.
2. (5 marks) Obtain a basis for $\mathbb{C}^{2 \times 2}$ over \mathbb{R} . Denoting this basis as $\{\underline{\alpha}_i : i = 1, \dots, n\}$, obtain the coefficients $c_i \in \mathbb{R}$ such that the matrix $\begin{bmatrix} 3 & i \\ 10 + 20i & 0.2 + 6i \end{bmatrix}$ can be written as $\sum_{i=1}^n c_i \underline{\alpha}_i$.