

QUIZ 5  
UNIVERSITY OF MASSACHUSETTS AMHERST  
MATH 235 – SPRING 2014  
MARCH 27, 2014

NAME: \_\_\_\_\_

(1) (2 points) Let  $\mathfrak{B} = \left\{ \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \right\}$ , and let  $\vec{x} = \begin{bmatrix} 5 \\ 7 \\ 9 \end{bmatrix}$ . Compute  $[\vec{x}]_{\mathfrak{B}}$ .

(2) (4 points) Suppose  $T$  is a linear transformation given by the matrix  $A = \begin{bmatrix} 2 & 0 \\ 0 & -2 \end{bmatrix}$ , and let  $\mathfrak{B} = \left\{ \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \end{bmatrix} \right\}$ . Compute the  $\mathfrak{B}$ -matrix for  $T$ .

*Turn page  $\longrightarrow$*

- (3) (4 points) Let  $V$  be the space of all infinite sequences of real numbers, and let  $T$  be the shift map. That is,  $T$  is defined by

$$T(x_0, x_1, x_2, \dots) = (x_1, x_2, \dots).$$

Answer each question as precisely as you can.

- (a) What is the “0” element of  $V$ ?

- (b) What is the kernel of  $T$ ?

- (c) What is the nullity of  $T$ ?

- (d) What is the image of  $T$ ?