

## MATH 304 Midterm 1 Sample 2-ANSWERS

**Problem 1.** 
$$\begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} -1 \\ 3 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} -1 \\ -1 \\ 1 \\ 0 \end{bmatrix} t + \begin{bmatrix} -1 \\ 2 \\ 0 \\ 1 \end{bmatrix} s$$

**Problem 2.**  $k = 1$  and  $k = 0$ .

**Problem 3.** Yes, it is a linear combination of the given vectors.

**Problem 4.** a) One of the possible answers is:

$$\begin{cases} x = 1 - 2t + s \\ y = 2 + 3t - 5s \\ z = 3 - 3t - s \end{cases}$$

b) Obtuse.

**Problem 5.**  $k = \frac{1}{4}$ .

HINT: RRE form of  $B$  is  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ , and the matrices  $A$  and  $B$  are row-equivalent if their RRE forms are equal. Find the values of  $k$ , such that RRE of  $A$  is not equal to  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ .

**Problem 6.** a)  $k \neq -1$ ,  $k \neq 2$ ; b) no values; c)  $k = -1$  and  $k = 2$ .

**Problem 7.** One of the possible forms of the answer:

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} -s - \frac{3}{2}t \\ s + \frac{5}{2}t \\ s \\ t \end{bmatrix}$$

**Problem 8.** Yes for (a), (c), and (d) with many possible explanations. No for (b): many counterexamples, for instance the  $1 \times 3$  matrix  $(1 \ 2 \ 0)$ .