Name .....

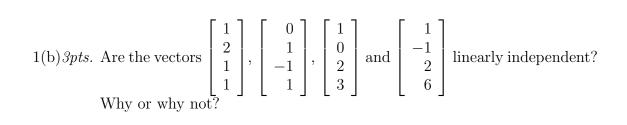
## PRACTICE EXAM 1 40pts.

- There are 6 pages in the exam including this page.
- Write all your answers clearly. You have to show work to get points for your answers.
- You can write on both sides of the paper. Indicate that the answer follows on the back of the page.
- Use of Calculators is *not* allowed during the exam.
- $(1) \ldots / 10$
- $(2) \ldots /10$
- $(3) \ldots / 8$
- $(4) \ldots / 12$

Total  $\ldots ... /40$ 

1(a) 7pts. Find all solutions to the given system of equations.

$x_1$			+	$x_3$	+	$x_4$	=	0
$2x_1$	+	$x_2$			—	$x_4$	=	0
$x_1$	—	$x_2$	+	$2x_3$	+	$2x_4$	=	0
$x_1$	+	$x_2$	+	$3x_3$	+	$6x_4$	=	0



2(a) 7*pts.* Let  $A = \begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ . Compute the inverse of A, if it exists.

2(b) 3pts. Find all possible solutions for the system

(3) *8pts.* Let 
$$v_1 = \begin{bmatrix} 1\\ 2\\ 1 \end{bmatrix}$$
,  $v_2 = \begin{bmatrix} 1\\ -1\\ 2 \end{bmatrix}$  and  $v_3 = \begin{bmatrix} 2\\ 1\\ h \end{bmatrix}$ .  
(a) *6pts.* Find all values of  $h$  such that  $v = \begin{bmatrix} 1\\ 2\\ 1 \end{bmatrix}$  in the Span $\{v_1, v_2, v_3\}$ ?

(b) 2pts. Let 
$$T : \mathbb{R}^3 \to \mathbb{R}^3$$
 be defined as  $T(\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}) = x_1v_1 + x_2v_2 + x_3v_3$ . For  
what values of  $h$  is  $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$  is in Im $T$ .

(4) 12pts. State True or False with justification. 3pts. each for the justification. (a) The linear transformation  $T : \mathbb{R}^3 \to \mathbb{R}^3$  defined by T(v) = v + v is a linear transformation.

(b) If A, B and C are  $2 \times 2$  invertible matrices then, (AB)C is invertible.

4(c) The vectors 
$$\begin{bmatrix} 4\\-8\\2 \end{bmatrix}$$
,  $\begin{bmatrix} 6\\-12\\3 \end{bmatrix}$  and  $\begin{bmatrix} -2\\4\\-1 \end{bmatrix}$ , span  $\mathbb{I}\!\mathbb{R}^3$ .

4(d) The matrix  $\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$  represents reflection about a line.