L	A	S	T		N	A	M	E						,	F	I	R	S	T		N	A	M	E	

Cover Sheet for 2014-2015 Spring Semester MATH 3210/5210 (Barsamian) Homework 4
(Due at the start of class Monday, February 16, 2014. Staple this cover sheet to the front of your work.)

Problem:	1	2	3	4	5	Total	Rescaled
Your Score:							
Possible:	20	20	20	20	20	100	10

Reading: In Chapter Two, read

Section II, Linear Independence, pages 102 – 110
Section III.1, Basis, pages 114 – 118
Section III.2, Dimension, pages 120 – 125
Section III.3 Vector Spaces and Linear Systems, pages 127 - 132

Suggested Exercises: (These 38 exercises are not to be turned in and are not graded, but you should do as many of them as possible and keep your solutions in a notebook for study. Note that detailed solutions to all of the Suggested Exercises are available in the solutions manual provided for free on the author's web site.)

This list is not the same as the list you received on your syllabus. Some exercise numbers have been changed.

Two.II.1 Exercises # 20, 21, 24, 27, 28, 29, 29, 30, 35, 42ac (from pages 110 - 114)
Two.III.1 Exercises # 18, 19, 20, 22, 23, 24, 28, 29, 31, 35, 37, 38 (from pages 118 - 120)
Two.III.2 Exercises # 19, 20, 25, 26, 27, 31, 33 (from pages 125 - 126)
Two.III.3 Exercises # 19, 20, 21, 25, 26, 27, 29, 37, 38, 40 (from pages 132 - 134)

Assigned Exercises: Turn in your solutions to the following five exercises, with this cover sheet stapled to the front of your work.

[1] Decide whether each subset A, B, C, D of $\mathbb{R}^3$ is linearly dependent or linearly independent. Show all details.

$$A = \left\{\begin{pmatrix}2\\2\\1\end{pmatrix}, \begin{pmatrix}5\\4\\3\end{pmatrix}, \begin{pmatrix}1\\-1\\1\end{pmatrix}\right\},\ B = \left\{\begin{pmatrix}4\\2\\1\end{pmatrix}, \begin{pmatrix}2\\3\\1\end{pmatrix}, \begin{pmatrix}6\\5\\2\end{pmatrix}\right\},\ C = \left\{\begin{pmatrix}5\\4\\2\end{pmatrix}, \begin{pmatrix}3\\2\\1\end{pmatrix}\right\},\ D = \left\{\begin{pmatrix}2\\2\\1\end{pmatrix}, \begin{pmatrix}5\\4\\3\end{pmatrix}, \begin{pmatrix}1\\-1\\1\end{pmatrix}, \begin{pmatrix}2\\5\\6\end{pmatrix}\right\}.$$

[2] Decide whether each subset E, F of $\mathcal{P}_2$ is linearly dependent or linearly independent. Show all details.

$$E = \{2 - x - x^2, 2 + x, 7 + 5x + x^2\}$$
$$F = \{1 + 2x^2, 6 - 3x + 9x^2, 3 - x + 5x^2\}$$

[3] (a) Show that any set of four vectors in $\mathbb{R}^3$ is linearly dependent. (Mimic the content of the textbook's solution of suggested exercise Two.II.1#35, but be more thorough, explain more clearly, and and do not use the author's words.)
(b) What is the greatest number of elements that a linearly independent subset of $\mathbb{R}^3$ can have? Explain.

[4] Decide if each is a basis for $\mathbb{R}^3$. Show all details clearly and explain.

$$(a)\left\langle\begin{pmatrix}4\\5\\3\end{pmatrix}, \begin{pmatrix}2\\2\\1\end{pmatrix}, \begin{pmatrix}-1\\1\\1\end{pmatrix}\right\rangle \quad (b)\left\langle\begin{pmatrix}3\\1\\2\end{pmatrix}, \begin{pmatrix}2\\1\\4\end{pmatrix}, \begin{pmatrix}5\\2\\6\end{pmatrix}\right\rangle \quad (c)\left\langle\begin{pmatrix}2\\1\\3\end{pmatrix}, \begin{pmatrix}4\\2\\5\end{pmatrix}\right\rangle \quad (d)\left\langle\begin{pmatrix}4\\5\\3\end{pmatrix}, \begin{pmatrix}2\\2\\1\end{pmatrix}, \begin{pmatrix}-1\\1\\1\end{pmatrix}, \begin{pmatrix}5\\2\\6\end{pmatrix}\right\rangle$$

[5] Using the basis $D = \langle x^3 + x^2 + x + 1, x^2 + x + 1, x + 1, 1\rangle$ for $\mathcal{P}_3$, represent vector $ax^3 + bx^2 + cx + d \in \mathcal{P}_3$ with respect to the basis D. Show all details clearly

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