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Cover Sheet for 2014-2015 Spring Semester MATH 3210/5210 (Barsamian) Homework 1
(Due at the start of class on Friday, January 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 One, read Sections One.I.1 and One.I.2, pages 1 – 22.

Suggested Exercises: On the course syllabus and on the course web page, you will find seventeen suggested exercises from Sections One.I.1 and One.I.2. These 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 online. Also note that the exams are based on the Suggested and Assigned Exercises.

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

Collaborating on Homework: Collaboration is encouraged; copying is not. See the remarks on the syllabus and web page for more information.

[1] (20 points) (Similar to One.I.1#18) Use Gauss's method on each system. If there are no solutions, say "no solution" and explain why. If there is exactly one solution find it and check your solution by substitution. (Show the check clearly.) If there are many solutions, write "many solutions" and explain why.

(a) $\begin{cases} 2x+3y=3 \\ x-y=4 \end{cases}$ (b) $\begin{cases} 2x+6y=3 \\ 4x+12y=5 \end{cases}$ (c) $\begin{cases} x-y-2z=2 \\ 4x-2y-2z=10 \end{cases}$ (d) $\begin{cases} 2x+2z=6 \\ x-y-2z=2 \\ 3x-y=8 \end{cases}$

[2] (20 points) (Similar to One.I.1#23) True or False: A system with three unknowns and two equations always has many solutions. You must justify your answer with a proof or a counterexample!

[3] (20 points) (Similar to One.I.2#18) Solve each system using matrix notation. Express the solution set using vectors. Show all steps clearly. Check your solutions by substitution. (Show the check clearly.)

(a) $\begin{cases} 3x+2y=0 \\ 6x-2y+3z=18 \\ 3x-4y-z=18 \end{cases}$ (b) $\begin{cases} x+z=2 \\ 2x-y+3z=6 \\ 3x-y+4z=8 \end{cases}$ (c) $\begin{cases} x+z=2 \\ 2x-y+3z=6 \\ 3x-y+4z=10 \end{cases}$

[4] (20 points) (Similar to One.I.2#21) Decide if the vector is in the set. Justify your answers.

(a) Is the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ in the set $\left\{ \begin{pmatrix} -6 \\ 9 \end{pmatrix} k \middle| k \in \mathbb{R} \right\}$?

(b) Is the vector $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ in the set $\left\{ \begin{pmatrix} 4 \\ 6 \end{pmatrix} j \middle| j \in \mathbb{R} \right\}$?

(c) Is the vector $\begin{pmatrix} 7 \\ -3 \\ 5 \end{pmatrix}$ in the set $\left\{ \begin{pmatrix} 3 \\ 0 \\ 1 \end{pmatrix} j + \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix} k \middle| j,k \in \mathbb{R} \right\}$?

(d) Is the vector $\begin{pmatrix} 16 \\ 5 \\ 8 \end{pmatrix}$ in the set $\left\{ \begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix} + \begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix} r \middle| r \in \mathbb{R} \right\}$?

[5] (20 points) (Similar to One.I.2#30) Make up a three equations / three unknowns system having

(a) no solutions. (b) exactly one solution. (c) a one-parameter solution set. (d) a two-param. solution set.

Either explain your answers, or provide answers that are so clear that they do not need explanations.