

Name: \_\_\_\_\_

Instructor: \_\_\_\_\_

**Math 10170, Exam I : Take Home Part**  
**March 6, 2015**

- The Honor Code is in effect for this examination. All work is to be your own.
- You may use your Calculator and Mathematica.
- This part of the exam should be handed in by Noon on Mar. 06, 2015.
- Please staple the pages together and be sure that your name is on every page in case pages become detached.
- Be sure that you have all 5 pages of the test.

**Please do NOT write in this box.**

1. \_\_\_\_\_

2. \_\_\_\_\_

Total \_\_\_\_\_

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### Partial Credit

You must show your work on the partial credit problems to receive credit!

1.(10 pts.)

$$\begin{aligned}2x_1 + x_2 + 3x_3 + x_4 + x_5 &= 1 \\x_1 + x_2 + 4x_3 + x_4 + 3x_5 &= 14 \\2x_1 + x_2 - x_3 + 2x_4 + 6x_5 &= 10 \\2x_1 + 2x_2 + 4x_3 + 7x_4 + 5x_5 &= 10 \\x_1 - x_2 - 3x_3 + 2x_4 + x_5 &= 14\end{aligned}$$

(a) Write the above system of equations as a matrix equation in the space below.

(b) Use Mathematica to solve the system of equations, print your worksheet as a pdf file and attach it to your completed take home exam with Question 1(b) written at the top of the page.

(c) what is the solution to the above set of equations?

$$x_1 = \underline{\hspace{2cm}}$$

$$x_2 = \underline{\hspace{2cm}}$$

$$x_3 = \underline{\hspace{2cm}}$$

$$x_4 = \underline{\hspace{2cm}}$$

$$x_5 = \underline{\hspace{2cm}}$$

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2.(18 pts.) The following shows the games played so far in the first division of the Northern Indiana Premier League soccer tournament.(scores and team abbreviations are shown in brackets) :

**Week 1** South Bend United [SBU] (7) vs. West Bend [WB] (1)  
 Elkhart City [EC] (2) vs. Goshen [G] (4)  
 Portage [RT] (0) vs. Laporte [L] (5)

**Week 2** Laporte [L](2) vs. West Bend [WB] (0)  
 South Bend United [SBU] (2) vs. Goshen [G] (1)  
 Elkhart City [EC] (0) vs. Portage [RT] (2)

**Week 3** West Bend [WB] (4) vs. Goshen [G] (2)  
 Laporte [L](3) vs. Elkhart City [EC] (2)  
 South Bend United [SBU](4) vs. Portage [RT] (3)

(a) Fill in the following table showing the scores for each game with the row players score first:

	SBU	WB	EC	G	P	L
SBU						
WB						
EC						
G						
P						
L						

(b) Calculate the total point differential for each team and fill in the table below.

i	Team i	Total Point Differential
1	SBU	
2	WB	
3	EC	
4	G	
5	P	
6	L	

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(c) Write out the linear system to be solved in order to get the Massey ratings as a matrix equation:

$$\mathbf{M}\mathbf{r} = \mathbf{P}.$$

(d) Create a worksheet in Mathematica to solve this system of equations using Mathematica, labeling your matrices from the above equation as  $m$ (for  $\mathbf{M}$ ) and  $p$ (for  $\mathbf{P}$ ). Use the command `MatrixForm[N[LinearSolve[m, p]]]` to get the results in decimal form and matrix form. Print the worksheet and attach it to this exam; write Question 2(d) on top of the page.

(e) What are the resulting Massey rankings for the teams?

Team	Rank
SBU	
WB	
EC	
G	
P	
L	

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(f) Write out the linear system to be solved in order to get the Colley ratings as a matrix equation:

$$\mathbf{Cr} = \mathbf{b}.$$

(g) Create a new worksheet in Mathematica to solve this system of equations using Mathematica, labeling your matrices from the above equation as  $c$ (for  $\mathbf{C}$ ) and  $b$ (for  $\mathbf{b}$ ). Use the command `MatrixForm[N[LinearSolve[c, b]]]` to get the results in decimal form and matrix form. Print the worksheet and attach it to this homework; write Question 2(g) on top of the page.

(h) What are the resulting Colley rankings for the teams?

Team	Rank
SBU	
WB	
EC	
G	
P	
L	