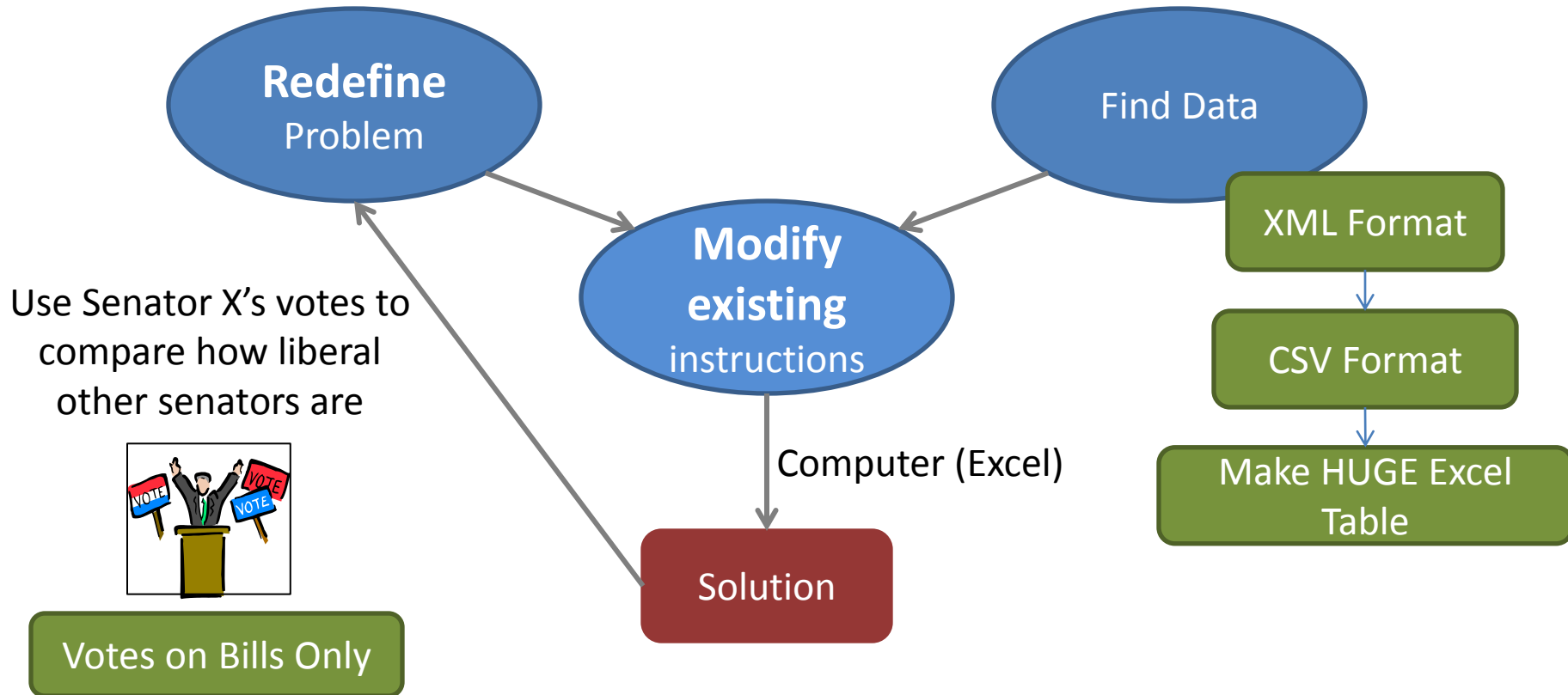


Discovering Voting Patterns

Feb. 14, 2012

Last Class (& HW1-2)

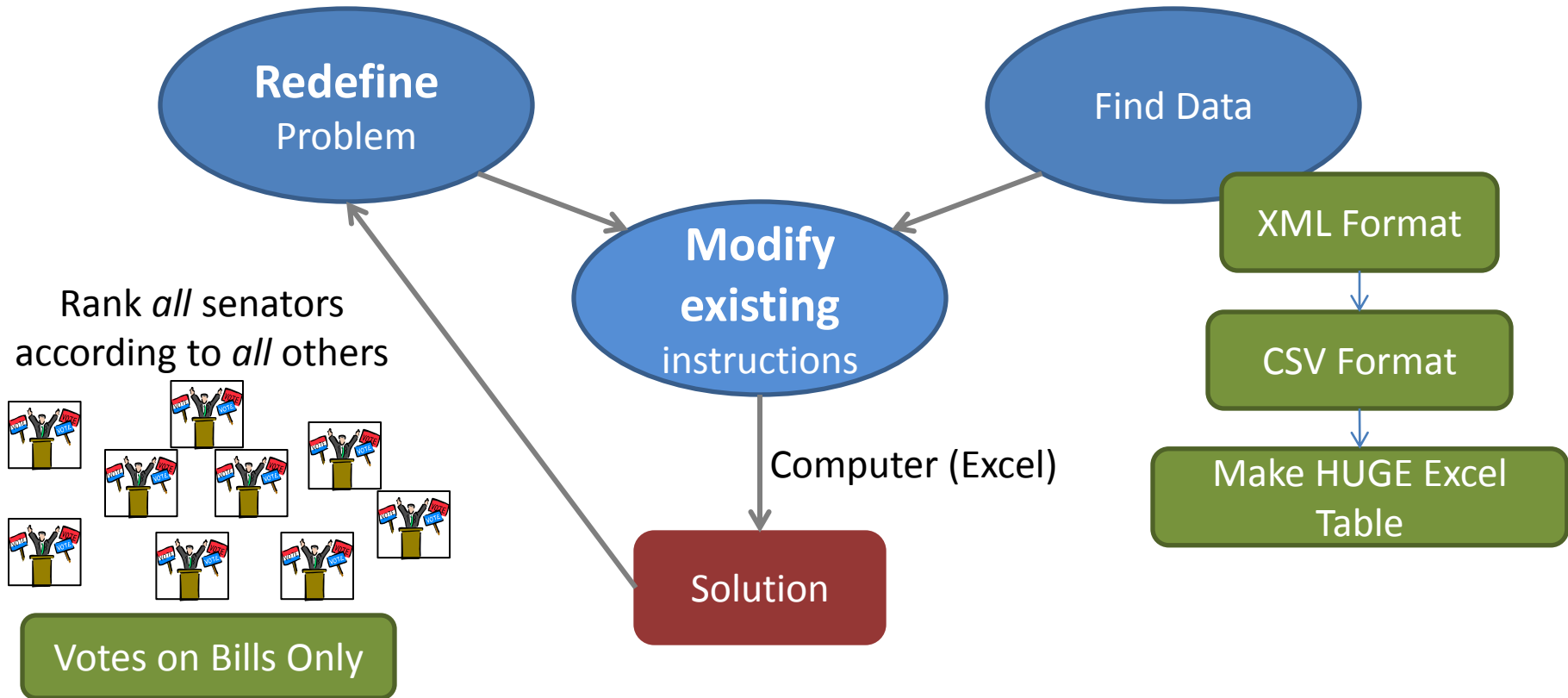


Finish ACT1-3

Finish ACT1-3

- The spreadsheet is now *interactive*
- But what if we want to look at how *all* senators rank compared to *all* others?

This Class



We can do this in **one** table. How?

Here's a Hint:

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	Senator's Name:	Akaka (D-HI)										
3	Senator's Alphabetic Rank	1										
4	(Akaka = 1 and Wyden = 101)											
5	(Use the PivotTable Sheet)											
6												
7	Senator's Name using OFFSET:	Akaka (D-HI)	Senator's Votes:	2	2	2	2	2	1	2	2	
8												
9		rank		1:109	1:11	1:125	1:158	1:168	1:170	1:172	1:189	1:19
10		1 Akaka (D-HI)		1	1	1	1	1	1	1	1	
11		0.244444444 Alexander (R-TN)		1	1	1	1	1	-1	1	1	
12		0.217391304 Allard (R-CO)		1	1	1	1	1	-1	1	1	
13		0.260869565 Allen (R-VA)		1	1	1	1	1	-1	1	1	
14		0.674418605 Baucus (D-MT)		1	1	1	1	1	1	1	1	
15		0.733333333 Bayh (D-IN)		1	1	1	1	1	1	0	1	
16		0.333333333 Bennett (R-UT)		1	1	1	1	0	-1	1	1	
17		0.866666667 Biden (D-DE)		1	0	1	1	1	1	1	1	
18		0.818181818 Bingaman (D-NM)		1	1	1	1	1	-1	1	1	
19		0.260869565 Bond (R-MO)		1	1	1	1	1	-1	1	1	
20		0.011111111 Boyd (D-CA)		1	1	1	1	1	1	1	1	

Instructions: Select a senator's name from the drop down box in B2 (the pink cell) and watch what happens.

We can do this in **one** table. How?

	Akaka	Alexander	Allard	Allen
Akaka				
Alexander				
Allard				
Allen				

Allard vs. Alexander

$$\frac{\text{num_agree} - \text{num_disagree}}{\text{num_agree} + \text{num_disagree}}$$

We can do this in **one** table. How?

	Akaka	Alexander	Allard	Allen
Akaka				
Alexander				
Allard				
Allen				

Allard vs. Alexander

$$\frac{\text{num_agree} - \text{num_disagree}}{\text{num_agree} + \text{num_disagree}}$$

Question: What values are on the diagonals?

We can do this in **one** table. How?

	Akaka	Alexander	Allard	Allen
Akaka	1			
Alexander		1		
Allard			1	
Allen				1

Allard vs. Alexander

$$\frac{\text{num_agree} - \text{num_disagree}}{\text{num_agree} + \text{num_disagree}}$$

Question: What values are on the diagonals?

We can do this in **one** table. How?

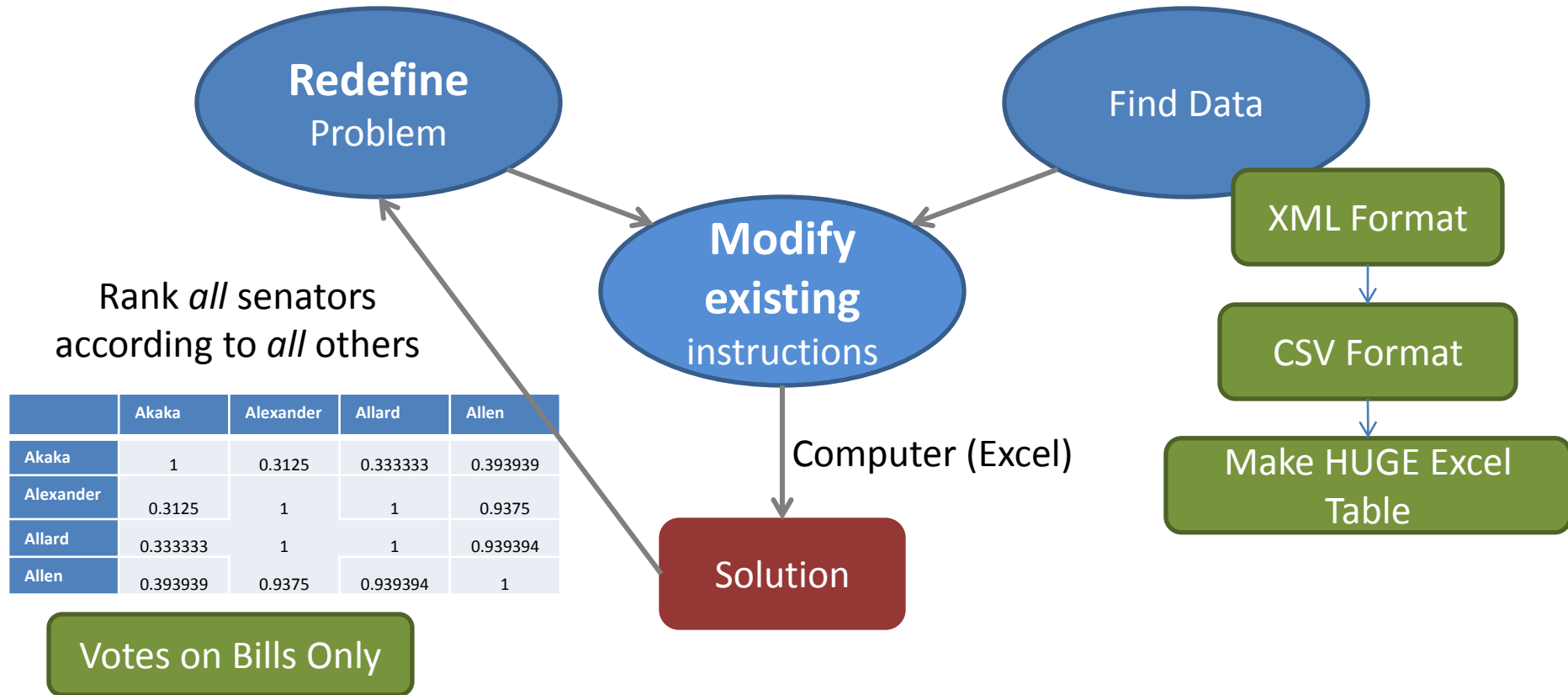
	Akaka	Alexander	Allard	Allen
Akaka	1	0.3125	0.333333	0.393939
Alexander	0.3125	1	1	0.9375
Allard	0.333333	1	1	0.939394
Allen	0.393939	0.9375	0.939394	1

Allard vs. Alexander

$$\frac{\text{num_agree} - \text{num_disagree}}{\text{num_agree} + \text{num_disagree}}$$

Question: What values are on the diagonals?

Next Goal



Break

Anna Ritz

Grad Student

Computer Science

Madison, WI



I played ultimate frisbee in college...
and lost to Brown at Nationals ☹

Project 1

Due Dates
Proposal: Th 2/16
Project: T 2/28

- **NOTE: New Deadline for Project Last Year's Projects**

<https://sites.google.com/site/theteapartyvotes11>

<https://sites.google.com/site/cs0931project1/>

Project 1

Due Dates

Proposal: Th 2/16

Project: T 2/28

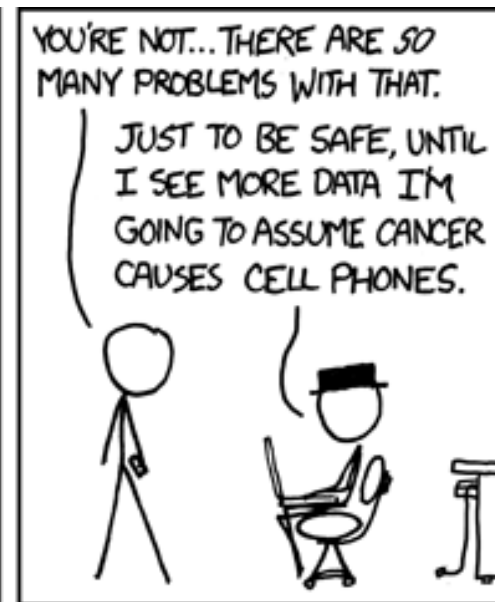
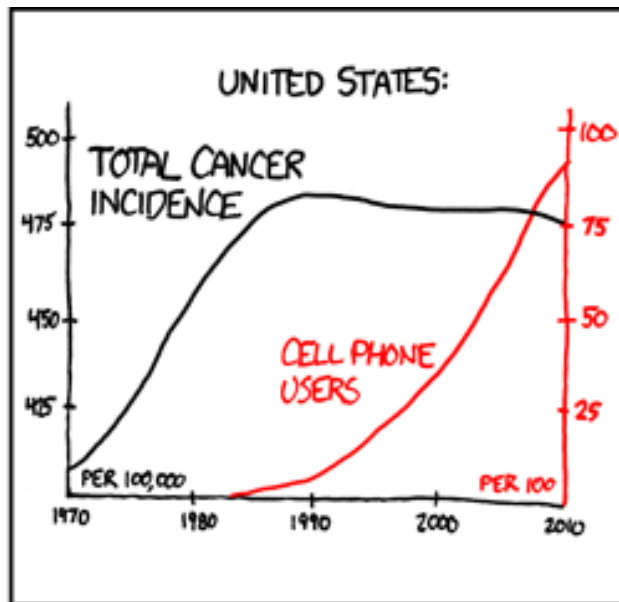
Degree of Difficulty (25 points)

- _____ (≤ 25 points) Lower bound, determined from proposal.
- _____ (10 points) Additional data formatting and error handling is addressed.
- _____ (10 points) Additional intermediate steps (including new formulas) are required to produce the result.
- _____ (5 points) The spreadsheet is interactive in some way - users can modify a cell and view a changed result.
- _____ Total (≤ 25 points)

Project 1

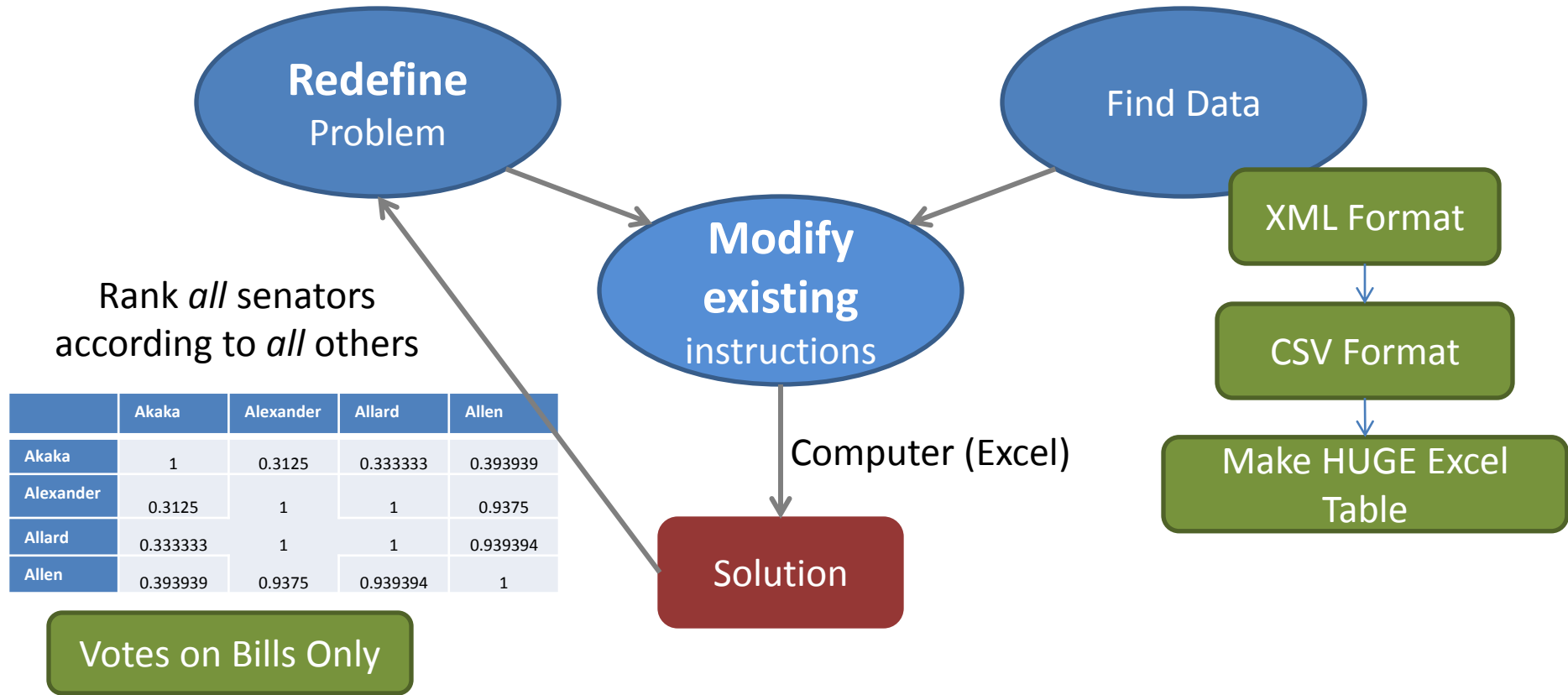
Due Dates
Proposal: Th 2/16
Project: T 2/28

A final note about identifying trends...



<http://xkcd.com/925/>

Next Goal



Next Goal

What We Have:

	1:1	1:2	1:3	1:4
Akaka	Yea	Yea	Nay	Not Voting
Alexander	Nay	Yea	Nay	Nay
Allard	Yea	Not Voting	Yea	Yea
Allen	Nay	Nay	Nay	Nay

What We Want:

	Akaka	Alexander	Allard	Allen
Akaka	1	0.3125	0.333333	0.393939
Alexander	0.3125	1	1	0.9375
Allard	0.333333	1	1	0.939394
Allen	0.393939	0.9375	0.939394	1

Next Goal

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Allard	0.333333	1	1	1
Allen	0.393939	0.9375	1	1

$$\frac{\text{num_agree} - \text{num_disagree}}{\text{num_agree} + \text{num_disagree}}$$

Next Goal

What We Have:

	1:1	1:2	1:3	1:4
Akaka	Yea	Yea	Nay	Not Voting
Alexander	Nay	Yea	Nay	Nay
Allard	Yea	Not Voting	Yea	Yea
Allen	Nay	Nay	Nay	Nay

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	10	11	13
Alexander	10	32	32	30
Allard	11	32	33	31
Allen	13	30	31	33

num_agree + num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	32	33	33
Alexander	32	32	32	32
Allard	33	32	33	33
Allen	33	32	33	33

We Need a Few More Tools: ACT1-4

- Do Task 1

We Need a Few More Tools: ACT1-4

- Do Task 1
- Do Task 2

We Need a Few More Tools: ACT1-4

- Do Task 1
- Do Task 2

$$\begin{array}{c} \text{3} \times \text{4 matrix} \\ \left[\begin{array}{cccc} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \mathbf{1} & \mathbf{2} & \mathbf{3} & \mathbf{4} \end{array} \right] \end{array} \begin{array}{c} \text{4} \times \text{5 matrix} \\ \left[\begin{array}{ccccc} \cdot & \cdot & \cdot & \mathbf{a} & \cdot \\ \cdot & \cdot & \cdot & \mathbf{b} & \cdot \\ \cdot & \cdot & \cdot & \mathbf{c} & \cdot \\ \cdot & \cdot & \cdot & \mathbf{d} & \cdot \end{array} \right] \end{array} = \begin{array}{c} \text{3} \times \text{5 matrix} \\ \left[\begin{array}{ccccc} \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \mathbf{x}_{3,4} & \cdot \end{array} \right] \end{array} .$$
$$x_{3,4} = (\mathbf{1}, \mathbf{2}, \mathbf{3}, \mathbf{4}) \cdot (\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}) = \mathbf{1} \times \mathbf{a} + \mathbf{2} \times \mathbf{b} + \mathbf{3} \times \mathbf{c} + \mathbf{4} \times \mathbf{d} .$$

Wikipedia

How Can Matrix Multiplication Help?

What We Have:

	1:1	1:2	1:3	1:4
Akaka	Yea	Yea	Nay	Not Voting
Alexander	Nay	Yea	Nay	Nay
Allard	Yea	Not Voting	Yea	Yea
Allen	Nay	Nay	Nay	Nay

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	10	11	13
Alexander	10	32	32	30
Allard	11	32	33	31
Allen	13	30	31	33

num_agree + num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	32	33	33
Alexander	32	32	32	32
Allard	33	32	33	33
Allen	33	32	33	33

How Can Matrix Multiplication Help?

What We Have:

	1:1	1:2	1:3	1:4
Akaka	1	1	-1	0
Alexander	-1	1	-1	-1
Allard	1	0	1	1
Allen	-1	-1	-1	-1

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	10	11	13
Alexander	10	32	32	30
Allard	11	32	33	31
Allen	13	30	31	33

num_agree + num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	32	33	33
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num_agree – num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	10	11	13
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num_agree + num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	32	33	33
Alexander	32	32	32	32
Allard	32	32	33	33
Allen	32	32	33	33

MMULT(Akaka's Row, TRANSPOSE(Alexander's Row))

How Can Matrix Multiplication Help?

What We Have:

	1:1	1:2	1:3	1:4
Akaka	1	1	-1	0
Alexander	-1	1	-1	-1
Allard	1	0	1	1
Allen	-1	-1	-1	-1

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	10	11	13
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num_agree + num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	32	33	33
Alexander	32	32	32	32
		32	33	33
		32	33	33

MMULT(Akaka's Row, TRANSPOSE(Alexander's Row))

?

How Can Matrix Multiplication Help?

What We Have:

	1:1	1:2	1:3	1:4
Akaka	1	1	-1	0
Alexander	-1	1	-1	-1
Allard	1	0	1	1
Allen	-1	-1	-1	-1

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	10	11	13
Alexander	10	32	32	30

num_agree + num_disagree

	Akaka	Alexander	Allard	Allen
Akaka	33	32	33	33
Alexander	32	32	32	32
		32	33	33
		32	33	33

MMULT(Akaka's Row, TRANSPOSE(Alexander's Row))

MMULT(ABS(Akaka's Row), TRANSPOSE(ABS(Alexander's Row)))

Steps in the Analysis

1. Create a formula that is 1 if a senator votes “Yea”, -1 if a senator votes “Nay”, and 0 otherwise.
2. Use MMULT() to create a Numerator sheet
3. Use MMULT() to create a Denominator sheet
4. Make the final table

$$\frac{\text{num_agree} - \text{num_disagree}}{\text{num_agree} + \text{num_disagree}}$$

Next Class



Rank *all* senators according to *all* others

	Akaka	Alexander	Allard	Allen
Akaka	1	0.3125	0.333333	0.393939
Alexander	0.3125	1	1	0.9375
Allard	0.333333	1	1	0.939394
Allen	0.393939	0.9375	0.939394	1

Votes on Bills Only

Computer (Excel)

Solution

XML Format

CSV Format

Make HUGE Excel Table

Reminders

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
2/12	2/13	2/14	2/15	2/16	2/17	2/18
		Today		Finish Voting Proposal Due		
2/19	2/20	2/21	2/22	2/23	2/24	2/25
		No Class Comments & Code Back		Start Textual Analysis HW2-1 Out		
2/26	2/27	2/28	2/29	3/1	3/2	3/3
		Project 1 Due HW2-1 Due				