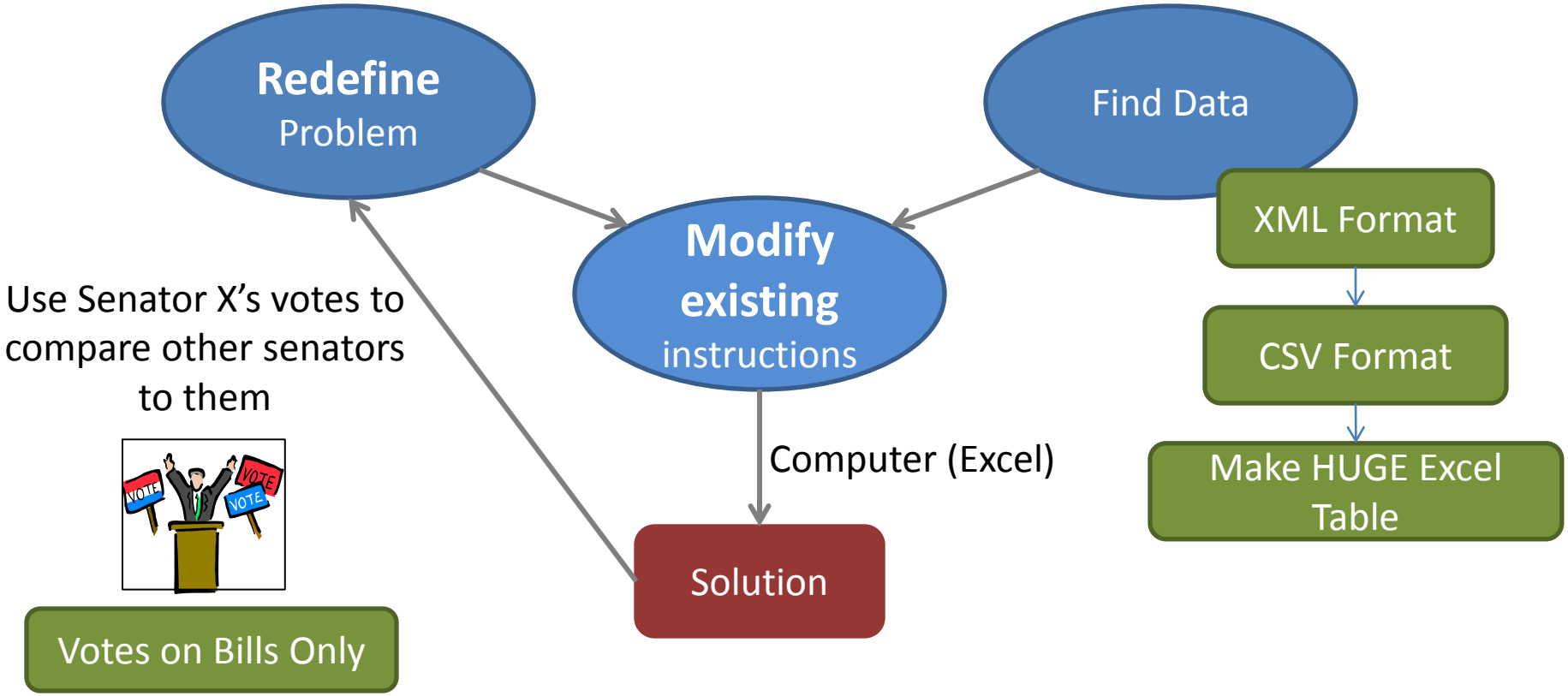
Discovering Voting Patterns

Feb. 12, 2012

Last Class (& HW1-2)



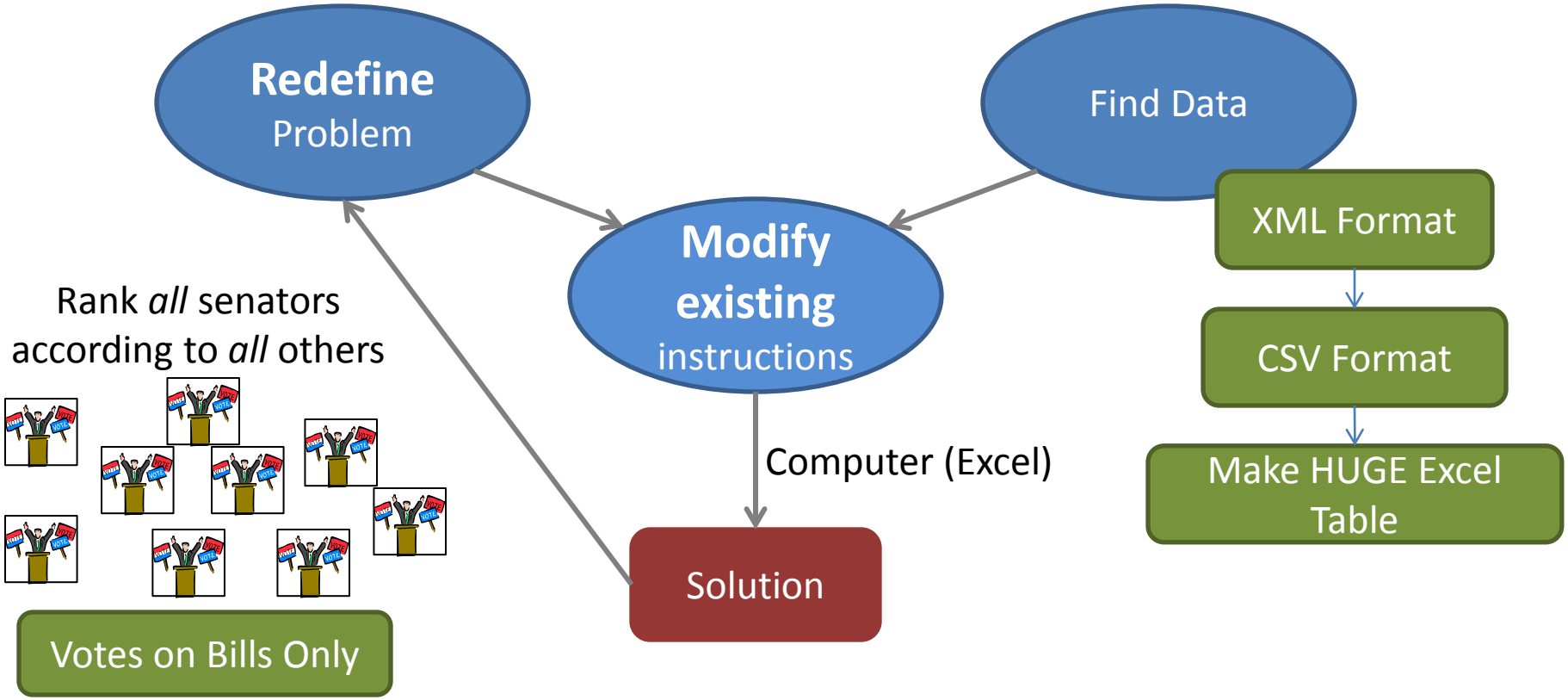
Finish ACT1-3

Finish ACT1-3

- The spreadsheet is now *interactive*

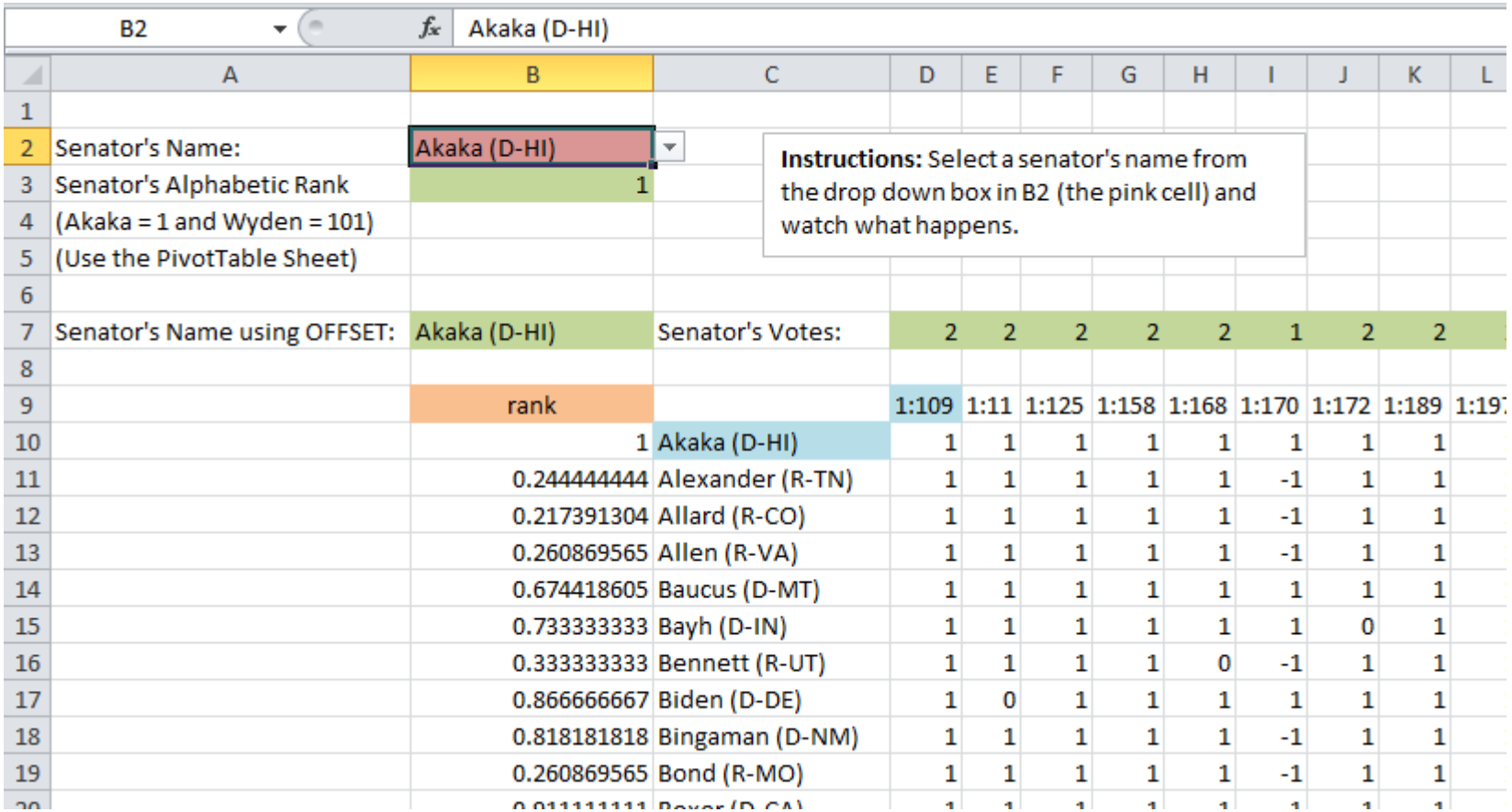
- But what if we want to look at how *all* senators rank compared to *all* others?

This Class


Redefine
Problem
Find Data
XML Format
Modify
existing
instructions
CSV Format
Rank *all* senators
according to *all* others
Computer (Excel)
Make HUGE Excel
Table
Solution
Votes on Bills Only

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

Here's a Hint:



B2 | Akaka (D-HI)

	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	

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	Ayotte	Barraso
Akaka				
Alexander				
Ayotte				
Barrasso				

Ayotte 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	Ayotte	Barraso
Akaka				
Alexander				
Ayotte				
Barrasso				

Ayotte 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	Ayotte	Barraso
Akaka	1			
Alexander		1		
Ayotte			1	
Barrasso				1

Ayotte 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?

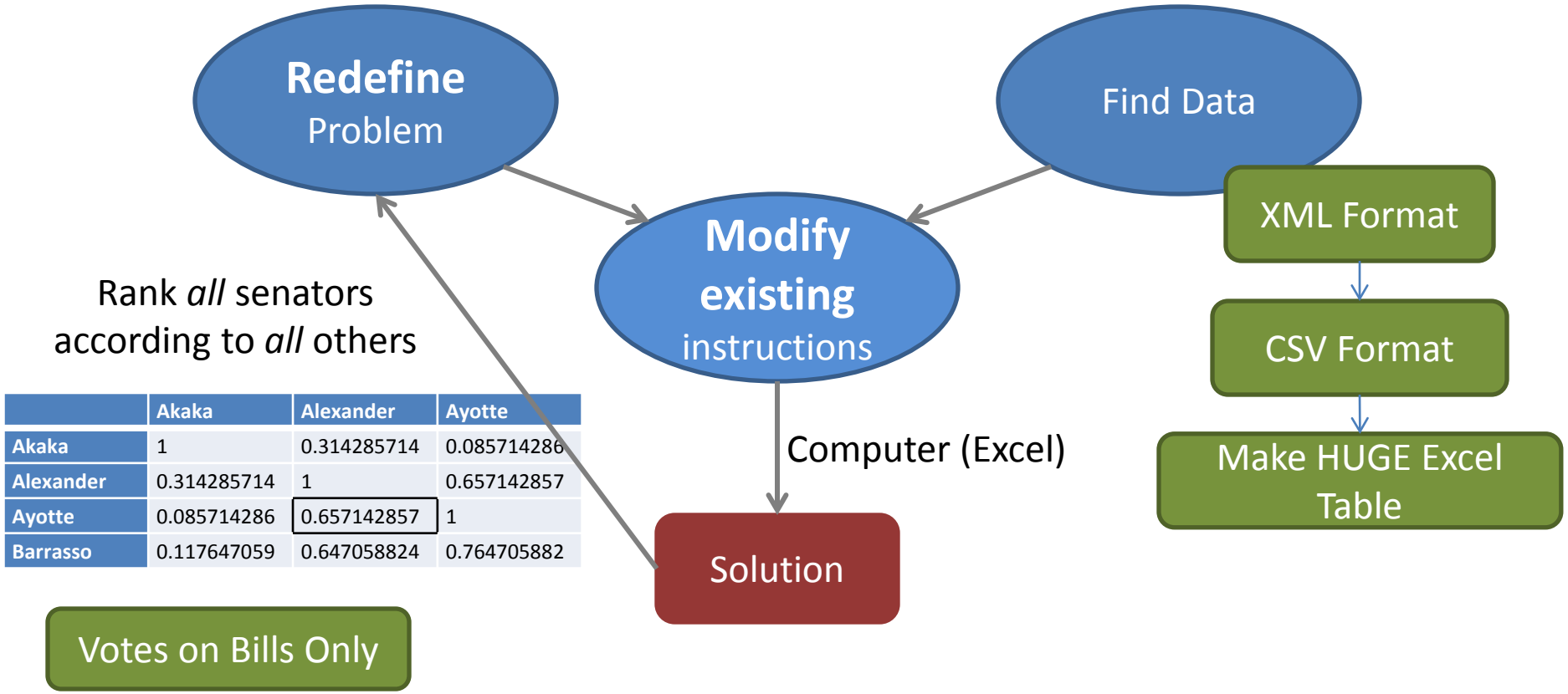
	Akaka	Alexander	Ayotte	Barraso
Akaka	1	0.314285714	0.085714286	0.117647059
Alexander	0.314285714	1	0.657142857	0.647058824
Ayotte	0.085714286	0.657142857	1	0.764705882
Barrasso	0.117647059	0.647058824	0.764705882	1

Ayotte vs. Alexander

$$\frac{\text{num\_agree} - \text{num\_disagree}}{\text{num\_agree} + \text{num\_disagree}}.$$

Question: What values are on the diagonals?

Next Goal



	Akaka	Alexander	Ayotte
Akaka	1	0.314285714	0.085714286
Alexander	0.314285714	1	0.657142857
Ayotte	0.085714286	0.657142857	1
Barrasso	0.117647059	0.647058824	0.764705882

Project 1

Due Dates
Proposal: Th 2/14
Project: Th 2/21

Degree of Difficulty (25 points)

_____ ($\leq$ 25 points) Lower bound, determined from proposal.

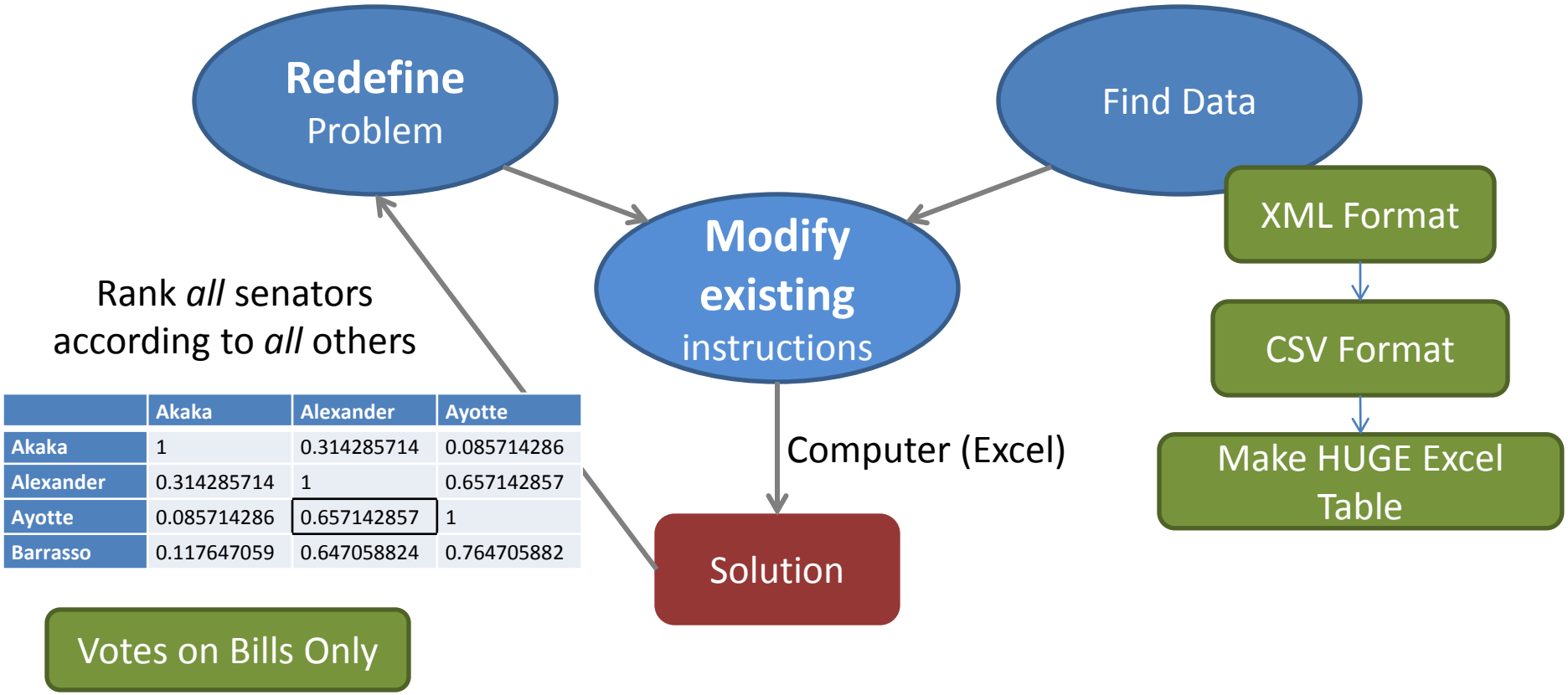
_____ (10 points) Additional data formatting and error handling is addressed.

_____ (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 ($\leq$ 25 points)

Next Goal



	Akaka	Alexander	Ayotte
Akaka	1	0.314285714	0.085714286
Alexander	0.314285714	1	0.657142857
Ayotte	0.085714286	0.657142857	1
Barrasso	0.117647059	0.647058824	0.764705882

Next Goal

What We Have:

	1:101	1:115	1:129	1:138
Akaka	Yea	Yea	Yea	Yea
Alexander	Yea	Yea	Yea	Yea
Ayotte	Nay	Yea	Yea	Yea
Barrasso	Yea	Yea	Yea	Yea

What We Want:

	Akaka	Alexander	Ayotte	Barraso
Akaka	1	0.314285714	0.085714286	0.117647059
Alexander	0.314285714	1	0.657142857	0.647058824
Ayotte	0.085714286	0.657142857	1	0.764705882
Barrasso	0.117647059	0.647058824	0.764705882	1

Next Goal

What We Have:

	1:101	1:115	1:129	1:138
Akaka	Yea	Yea	Yea	Yea
Alexander	Yea	Yea	Yea	Yea
Ayotte	Nay	Yea	Yea	Yea
Barrasso	Yea	Yea	Yea	Yea

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Ayotte	Barrasso
Akaka	33	10	11	13
Alexander	10	32	32	30
Ayotte	11	32	33	31
Barrasso	13	30	31	33

num_agree + num_disagree

	Akaka	Alexander	Ayotte	Barrasso
Akaka	33	32	33	33
Alexander	32	32	32	32
Ayotte	33	32	33	33
Barrasso	33	32	33	33

We Need a Few More Tools: ACT1-4

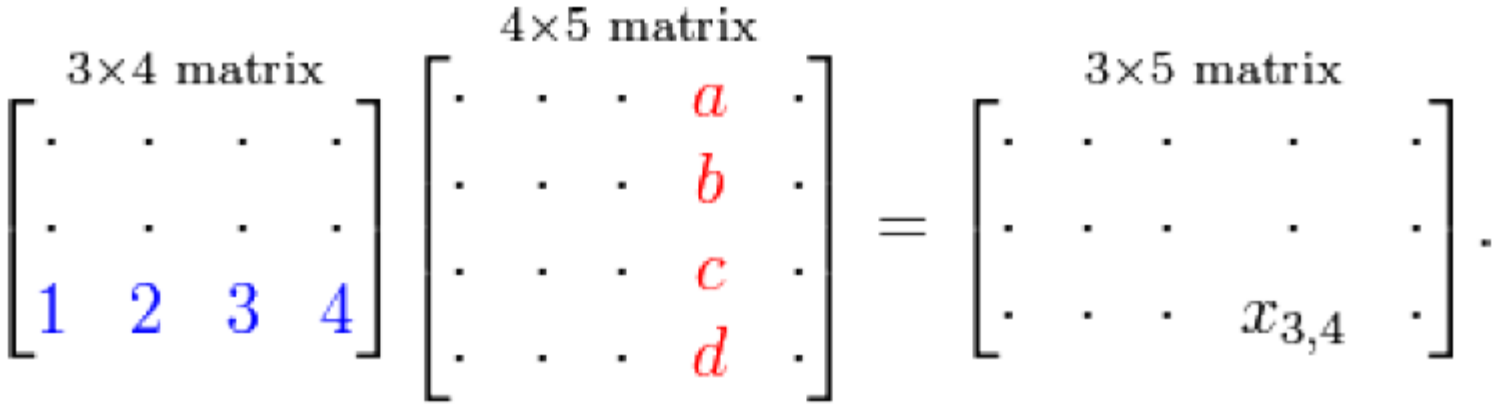
- Do Task 1

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



$$x_{3,4} = (1,2,3,4) \cdot (a,b,c,d) = 1 \times a + 2 \times b + 3 \times c + 4 \times d.$$

Wikipedia

We Need a Few More Tools: ACT1-4

- Do Task 1
- Do Task 2
- Do Task 3

How Can Matrix Multiplication Help?

What We Have:

	1:101	1:115	1:129	1:138
Akaka	Yea	Yea	Yea	Yea
Alexander	Yea	Yea	Yea	Yea
Ayotte	Nay	Yea	Yea	Yea
Barrasso	Yea	Yea	Yea	Yea

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Ayotte	Barrasso
Akaka	33	10	11	13
Alexander	10	32	32	30
Ayotte	11	32	33	31
Barrasso	13	30	31	33

num_agree + num_disagree

	Akaka	Alexander	Ayotte	Barrasso
Akaka	33	32	33	33
Alexander	32	32	32	32
Ayotte	33	32	33	33
Barrasso	33	32	33	33

How Can Matrix Multiplication Help?

What We Have:

	1:101	1:115	1:129	1:138
Akaka	1	1	1	1
Alexander	1	1	1	1
Ayotte	-1	1	1	1
Barrasso	1	1	1	1

What We Want:

num_agree – num_disagree

	Akaka	Alexander	Ayotte	Barrasso
Akaka	33	10	11	13
Alexander	10	32	32	30
Ayotte	11	32	33	31
Barrasso	13	30	31	33

num_agree + num_disagree

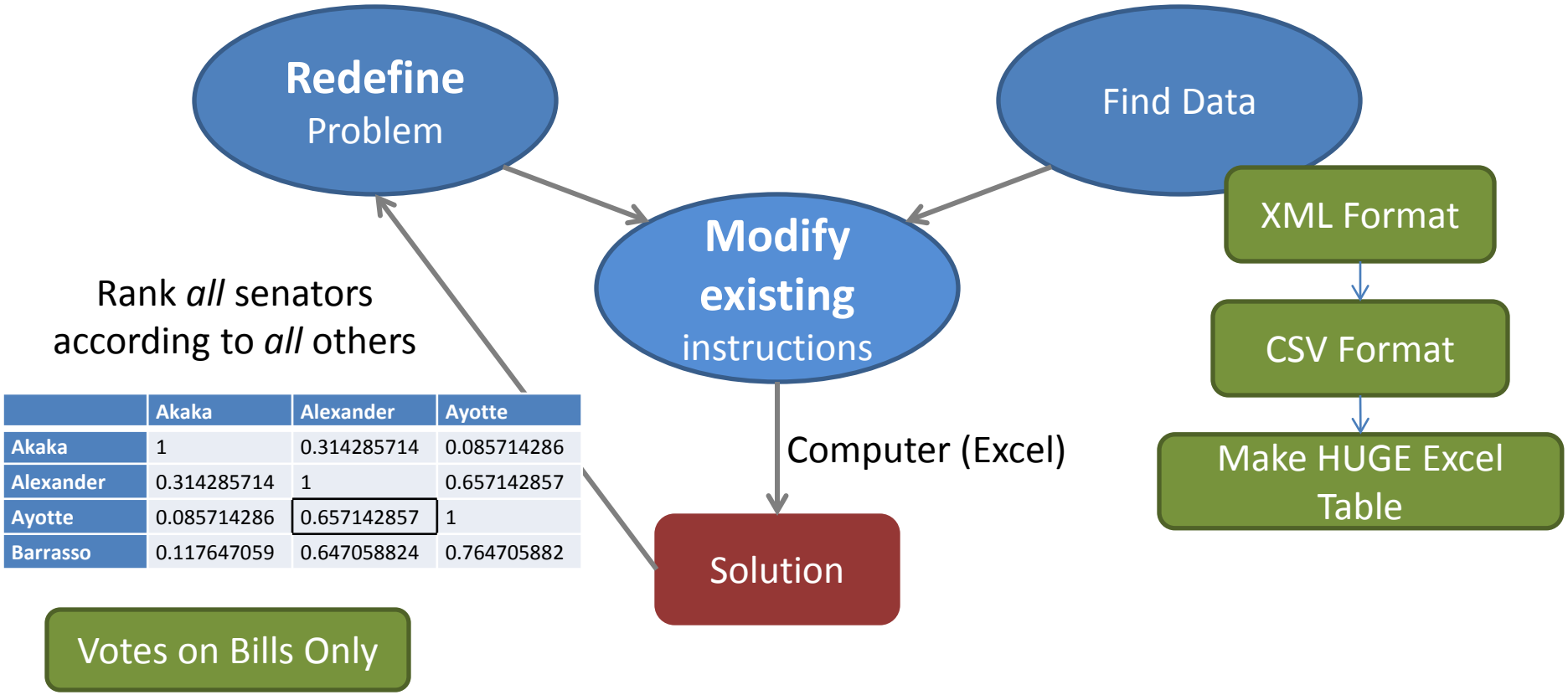
	Akaka	Alexander	Ayotte	Barrasso
Akaka	33	32	33	33
Alexander	32	32	32	32
Ayotte	33	32	33	33
Barrasso	33	32	33	33

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



	Akaka	Alexander	Ayotte
Akaka	1	0.314285714	0.085714286
Alexander	0.314285714	1	0.657142857
Ayotte	0.085714286	0.657142857	1
Barrasso	0.117647059	0.647058824	0.764705882