

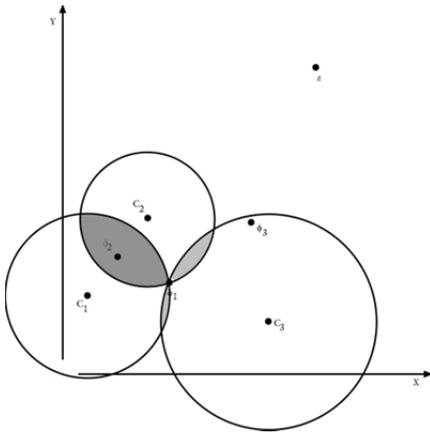
17.251
Spring 2016
Problem set 2 answers

Questions are repeated using *italics*. Answers are in Roman type.

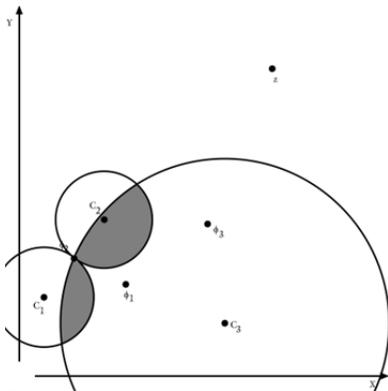
A. Do the following problems from the end of Chapter 1 of Analyzing Congress, 2nd ed.: 7, 8, 10, and 11.

Question 7. In the following figures, the preferred-to-sets against the status quo have been drawn. The shaded areas indicate where at least two preferred-to-sets intersect, forming the win-set.

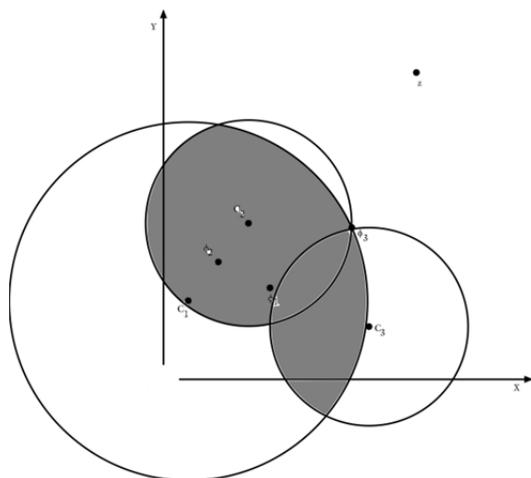
ϕ_1 as status quo:



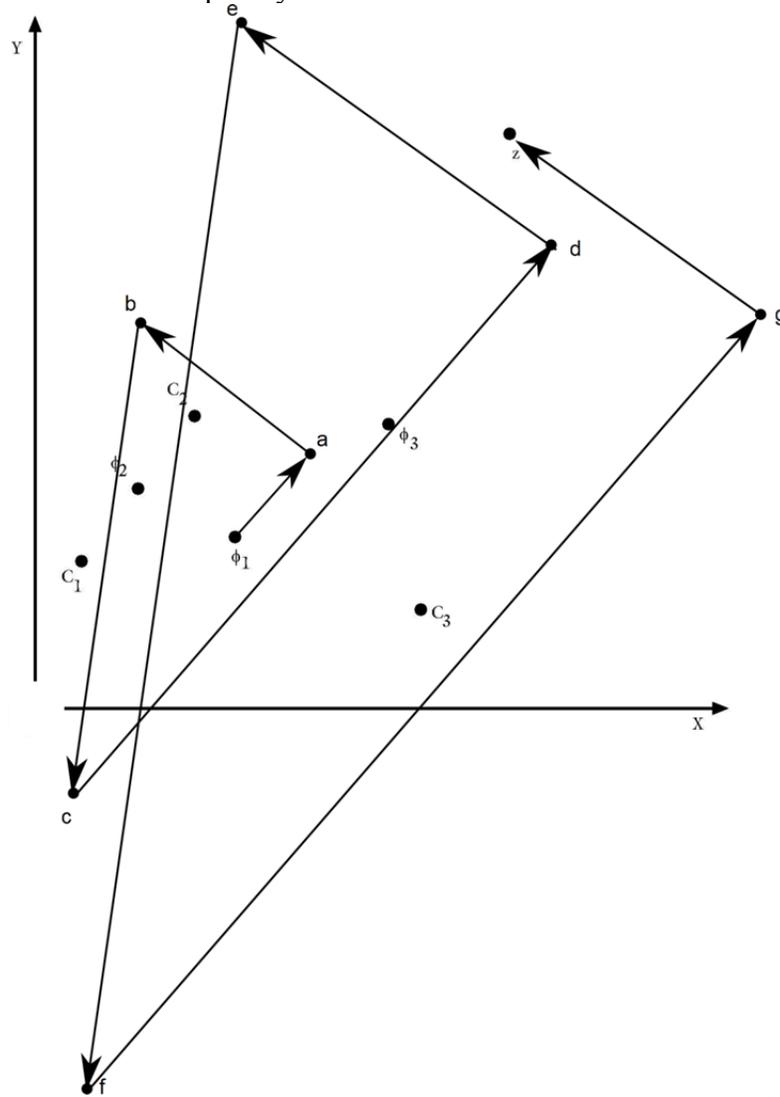
ϕ_2 as status quo:



ϕ_3 as status quo:



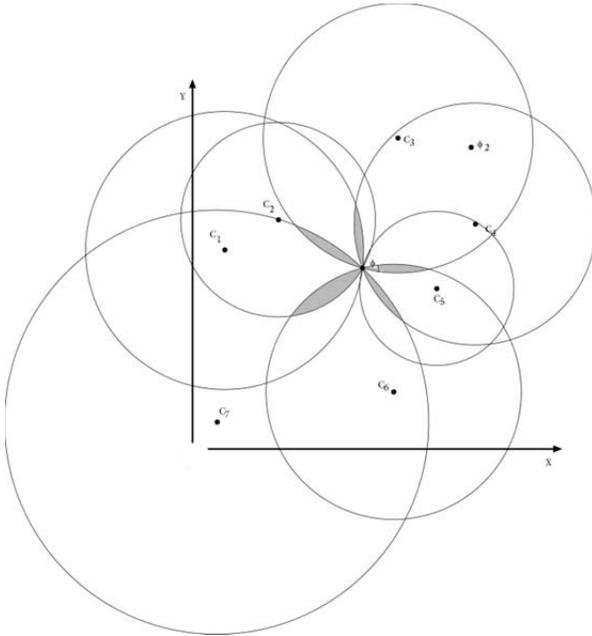
Question 8. The following agenda is one of an infinite number of agendas that gets one from the middle of the Pareto set out to point z . You will notice that the general pattern of the agenda is to “spiral” the succeeding motions out toward z . Such a strategy is perhaps the most direct one that moves far from the Pareto set so quickly.



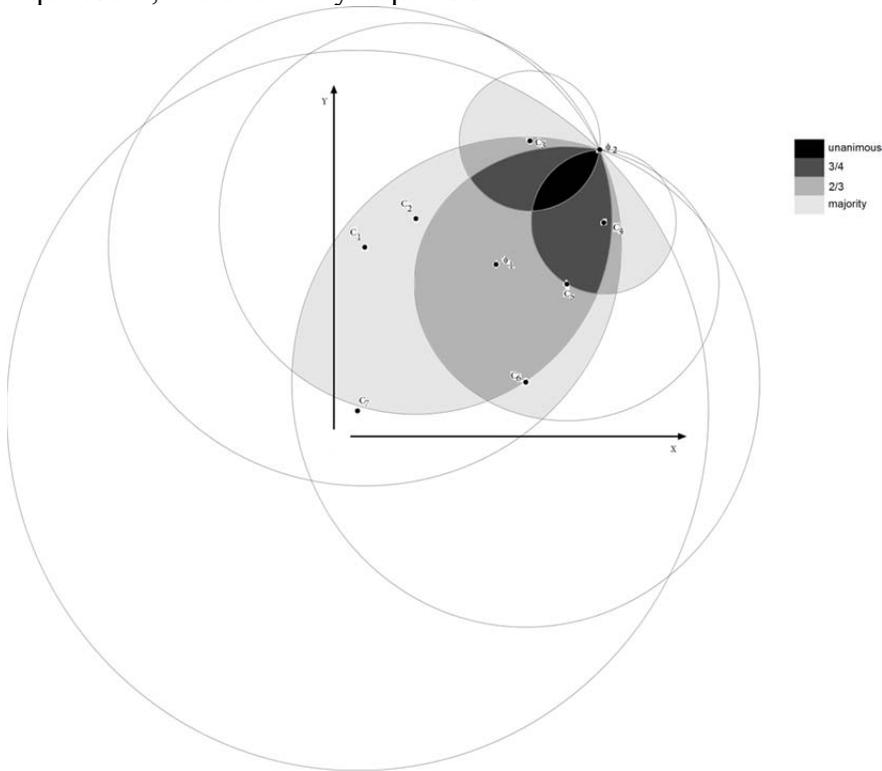
The following chart summarizes the motions and the coalitions voting for the motions:

Status quo	Motion	Coalition voting for motion	Coalition voting for status quo
ϕ_1	a	2,3	1
a	b	1,2	3
b	c	1,3	2
c	d	2,3	1
d	e	1,2	3
e	f	1,3	2
f	g	2,3	1
g	z	1,2	3

Question 10. All of the circular indifference curves in the figure below are drawn through ϕ_1 . The shaded area is the region that beats ϕ_1 by a simple majority. There is no region that a two-thirds, three-quarters, or unanimous majority prefers compared to ϕ_1 .

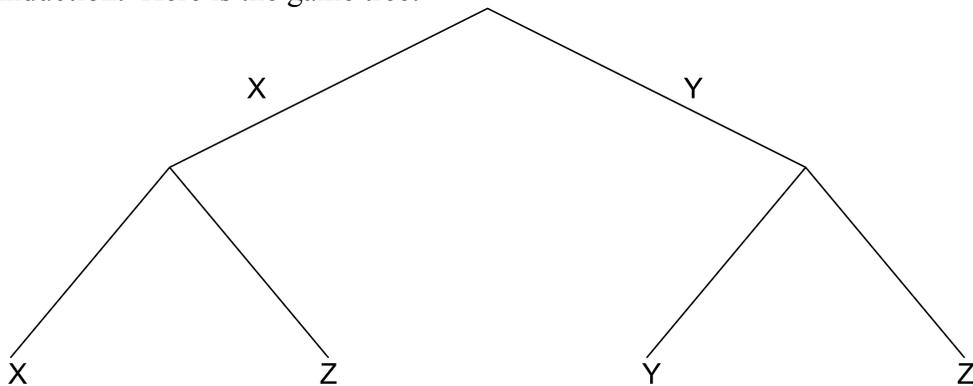


All of the circular indifference curves in the figure below are drawn through ϕ_2 . The shaded regions denote the areas that beat ϕ_2 by different majorities. With an electorate of seven members, a simple majority requires four votes, a 2/3 majority requires five, a 3/4 majority requires six, and unanimity requires seven.

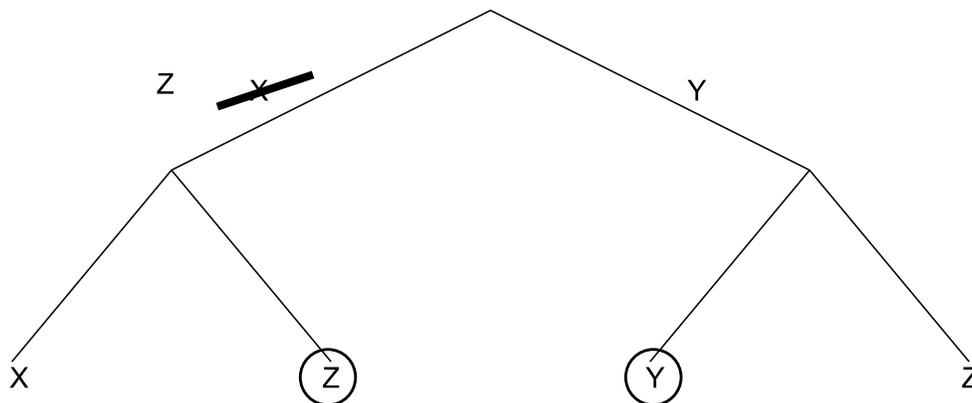


Question 11. With sincere voting, each legislator simply consults his/her preference ordering, voting for the options s/he prefers more. On the first vote, X is paired against Y . Legislator 1 and 3 prefer X to Y , while Legislator 2 prefers Y to X . Therefore, alternative X wins the first round. The second round pits X against Z . Legislator 1 prefers X to Z , while Legislators 2 and 3 prefer Z to X . Therefore alternative Z prevails under sincere voting.

With sophisticated voting, it is best to draw out the game tree and then implement backward induction. Here is the game tree:



Under backward induction, we start at the bottom of the game tree, calculate which alternative would prevail on a majority vote at that level, and then adjust the prior voting level according to the winner at the last level. (With a longer game tree, we would iterate up through the tree, until we get to the top.) In this case, Z beats X in a majority vote, while Y beats Z. We can indicate this on the game tree by replacing the sincere outcomes with the “sophisticated equivalent” as follows:



On the left-hand branch, we know that if X and Z are paired against each other Z prevails. We therefore circle it, cross-off the X on the branch above, and replace it with the Z. On the right-hand branch, we know that if Y and Z are paired, Y prevails. This is the alternative in the branch immediately above; therefore, we leave it unchanged. The graph reveals to us that the sophisticated equivalent of voting for X on the first round is eventual victory for Z. Therefore, a sophisticated voter would treat the first round of voting as a contest between (and eventual victory for) Z against Y. Because a majority prefer Y to Z, it prevails on the first round, and then on the second round. Y wins under sophisticated voting.

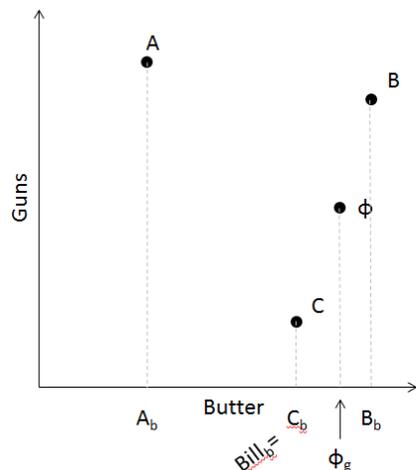
B. The following figure shows the ideal points of a three-person legislature that is deciding on spending levels along two dimensions, Guns and Butter. The status quo (ϕ) is also indicated.

Decisions are made using the following rules:

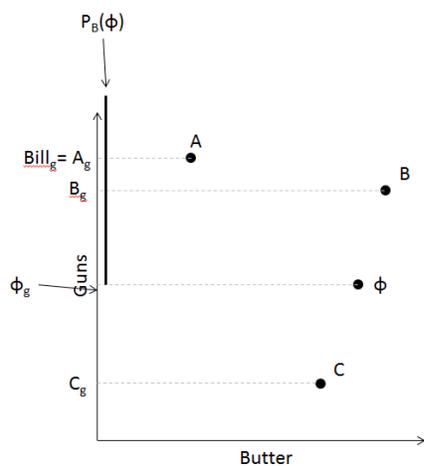
- *Motions are voted on one dimension at a time.*
- *An agenda-setter makes a motion that is decided by the chamber on a take-it-or-leave-it basis. (In other words, if the proposal is rejected by a majority vote, the game is over and the status quo prevails.)*
- *Decisions are made based on majority rule.*

B1. Show the policy outcome if Member A is the agenda-setter on the Guns dimension and Member C is the agenda-setter on the Butter dimension.

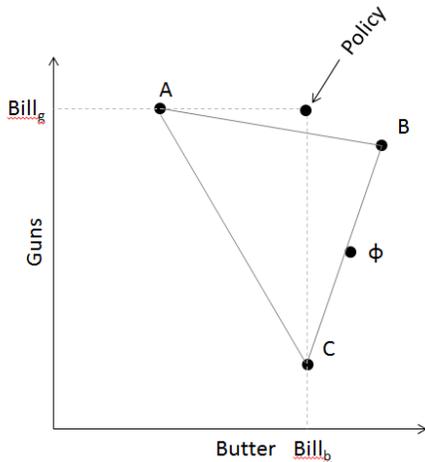
Step 1: (See the drawing below.) Find the policy outcome on the Butter dimension. First, project all the ideal points and the status quo down to the Butter (x -) axis. Note that C, the agenda-setter, is the median in this direction. Therefore, C can propose a bill along the Butter dimension that corresponds with C's ideal point. This point is identified as Bill₀ on the figure.



Step 2: (See the drawing below.) Find the policy outcome on the Guns dimension. First, project all the ideal points and the status quo over to the Guns (y -) axis. Unlike Step 1, A is not the median on this dimension, B is. Therefore, we need to draw the preferred-to set for member B against the status quo on the Guns dimension. This is indicated on the drawing as $P_b(\phi)$. Note that A's (projected) ideal point is within $P_b(\phi)$. Therefore, A can propose A's ideal point and both A and B will vote for it. This is indicated by equating $Bill_g$ with A_g on the figure.



Step 3. (See the drawing below.) Combine the results from the two dimensions. The figure below shows the bills in the two dimensions that were derived above. The two-dimensional coordinate that results is marked as Policy. I have also drawn the Pareto curve. Note that the status quo was just touching the Pareto curve. The resulting policy is clearly further away from the Pareto curve than where we started.



B2. The answer for B1 will be a point in the policy space in the figure. Show the win set against the policy that results from answer B1.

The figure below shows the answer. I have drawn the win set against the resulting policy and shaded it in. I have also retained the Pareto set from the previous figure, to illustrate that there is a small area — the petal-shaped portion of the win set immediately below Policy — that is unanimously favored compared to Policy. Note, however, that you cannot reach the Pareto set moving one dimension at a time so long as A is the agenda-setter for Guns policy and C is the agenda-setter for Butter. Indeed, you can't move anywhere in the win set under these conditions.

