

PALLASSA

GAIAN
OCEAN

CRONAN
OCEAN

02

SET

THE

STALLUM

I

I HATE

Ageleia

Lake
Gnosi

Akadimía

Lake
Sophis

Elis

River Dikaíosyni

Euripus Strait

Chalcis

Euboea

Andros

Ermioni

Spíti-ton-
Archónton

Diplomats'
Corner

River Tyrannía

THE PRYTANEION

Lake Thálassa

HESTALLUM

Fields of
Eirine

Oikos

River Adiko

Ephesus

Próti
Flóga

River Dimokratía

my house!

THE
OLYMPIAN
PRYTANEION
[under construction]

ESTIAN
PENINSULA

Skyros

Xaίρε, friend. Did you have trouble getting here? These technocrats have no idea how to design a transit system—the bridge to Próti Flóga only has four lanes! I missed my last flight back home to the Hephæstines due to traffic! (Naturally, the airport for the Olympian Prytaneion is on the unmade hemisphere....)

I hate to be a naysayer, but I don't think they're *ever* going to finish this stupid island. It doesn't help that the Olympian Government got off to such a bad start because of the bickering. I've been thinking a bit about just what went wrong; after all, we're planning on the Olympian Prytaneion to be a guiding light bringing peace and justice to Olympia!

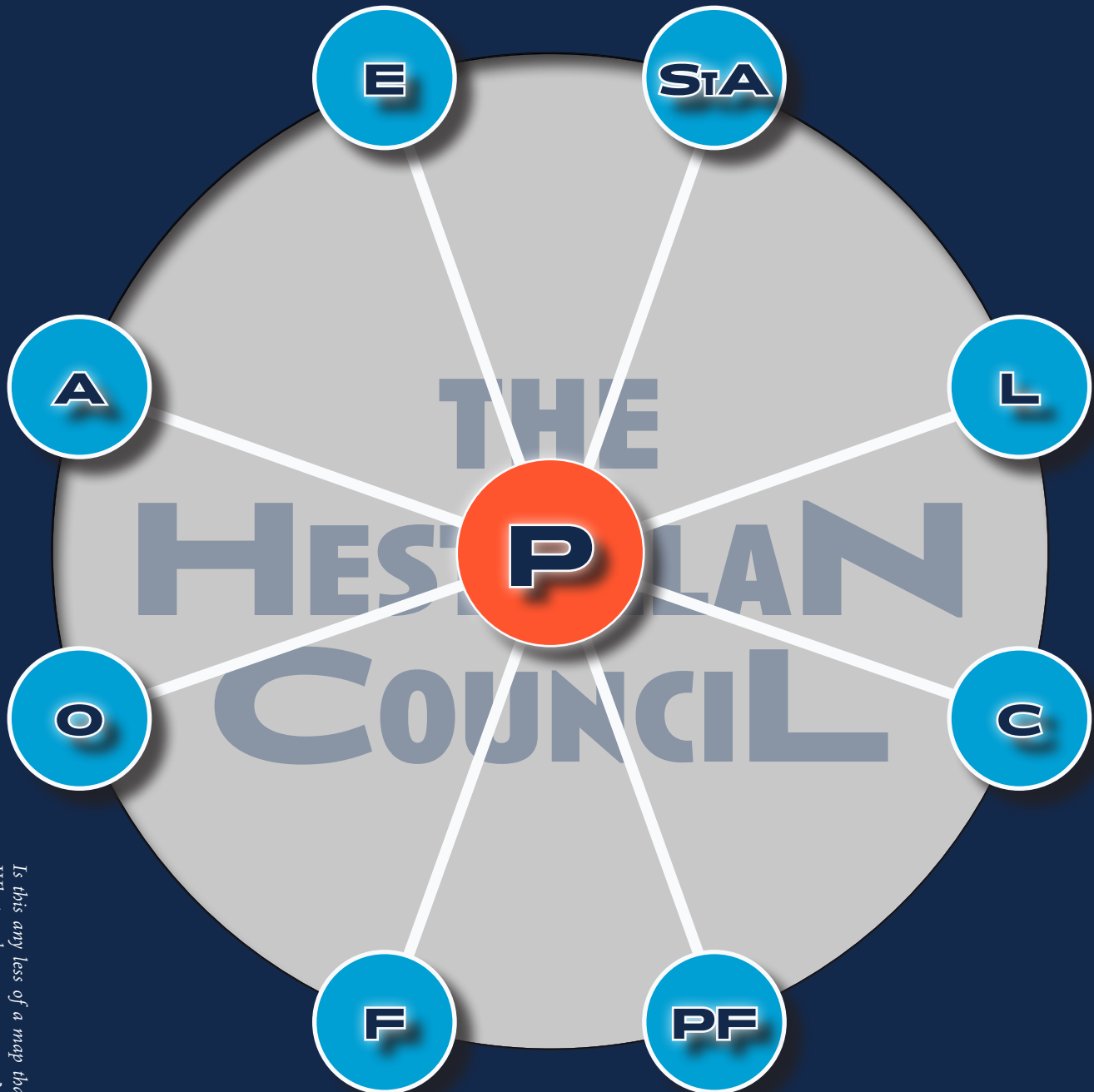
Naturally, that meant the self-righteous, oh-look-at-us-we-invented-democracy Hestallans wanted the island next to them. Lah-dee-**FRICKIN**-dah, all the best technocrats are from Hestallum. Sorry, Socrates, but we can't just give *anybody* a job at the Academy at Elis—only the very best (read: Hestallan) minds are worthy of joining our faculty.

But guess what, Vesta Diaphthora, Diva of the Hestallans? I see through your little ruse, and I'm going to *bring you down*.

You know why? Because I **HATE** HESTALLUM.

S
O
C
R
A
T
E
S

Hestallum is divided into eight provinces, along with a Federal District coincidental with The Prytaneion. Each province is named after its capital city; you can find all of the capital cities on the map above and the standardized abbreviations in the schematic below.



Each province elects a senator to sit on the Hestallan Council, which is chaired by the senator from the Federal District (otherwise known as the *Diva of the Hestallans*). At the moment, the Diva is none other than the repugnant Vesta Diaphthora. Since the Diva sets the Council's agenda, Vesta holds immense sway on Hestallan politics—I'll show you how once we've done some initial analysis of the former status quo, which takes us to today.

Is this any less of a map than the one on the previous page? What makes a map a map? What makes a good map a good map? Is a good map good in all contexts?

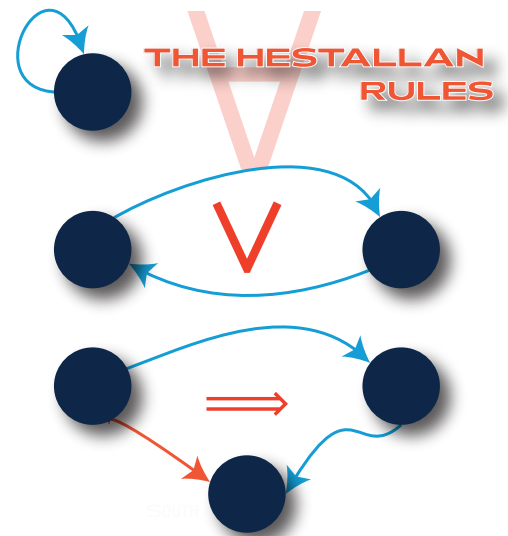
PART 1 | FEET TO THE FIRE

The Council was a bit of a mess when Vesta was first elected Diva. There had once been a norm that all senators announced their policy positions openly and answered all questions on all topics, but that norm had eroded to the point that many senators' preferences were difficult to pin down.

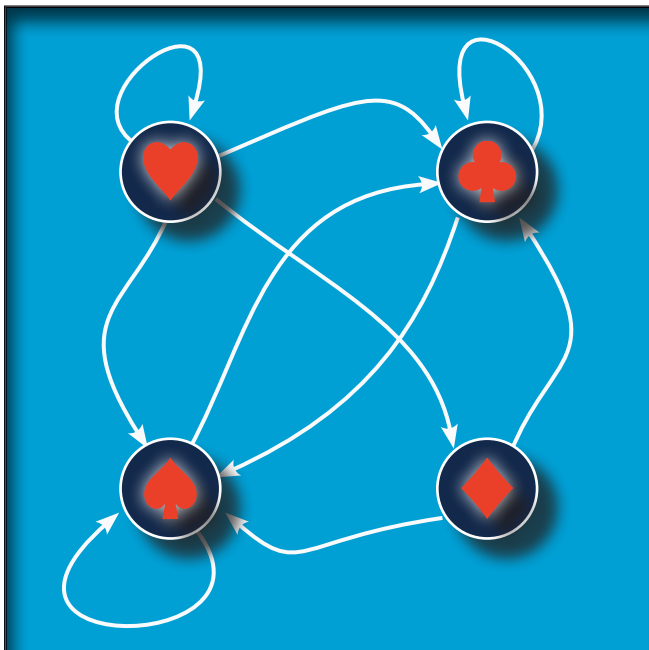
On the topic of participation in the Olympian Prytaneion Project, there were four main policies in elite discourse:

- ♥ ~~~> attempt to seize the O.P.
- ♣ ~~~> abandon support for the O.P.P.
- ♠ ~~~> maintain neutral support for the O.P.P.
- ♦ ~~~> recruit other states' help for the O.P.P.

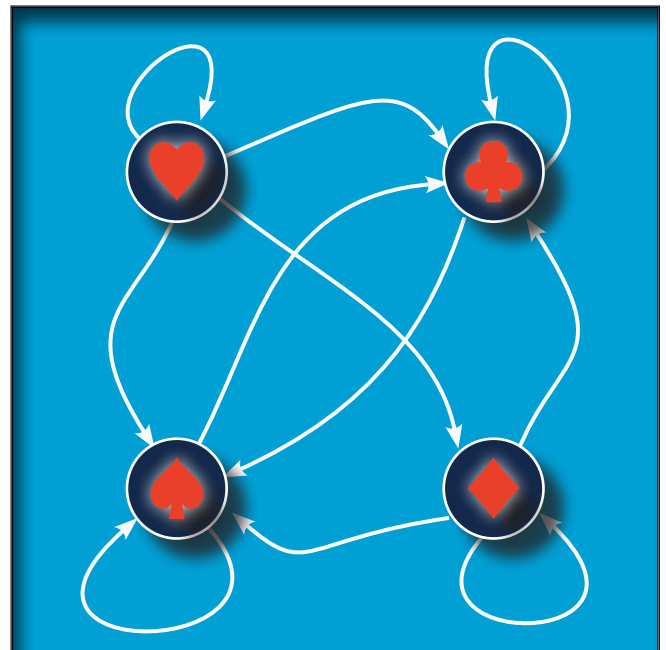
At the time of Vesta's election, the on-the-record preferences looked like the following set of doodles. For each province, please determine whether that province abides each of the three Hestallan Rules. If it does, assign utility scores to each policy. If it does not, demonstrate why with a counterexample.



Senator 1: Andros



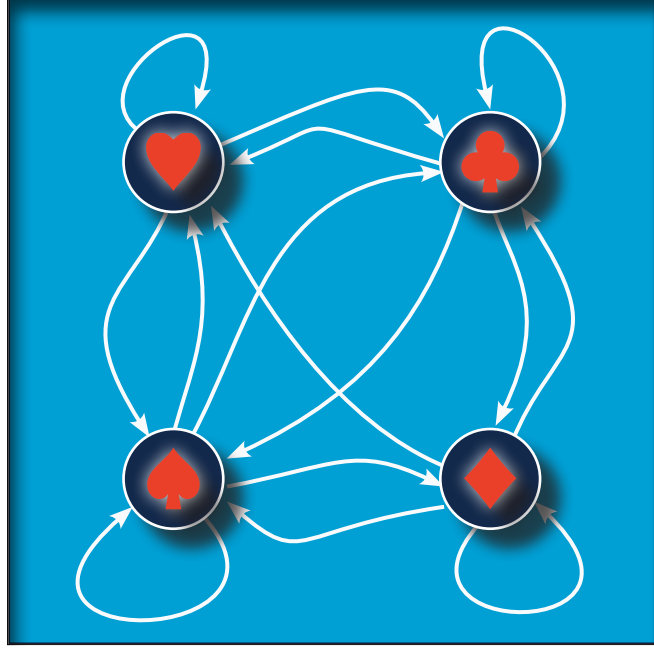
Senator 2: Ermioni



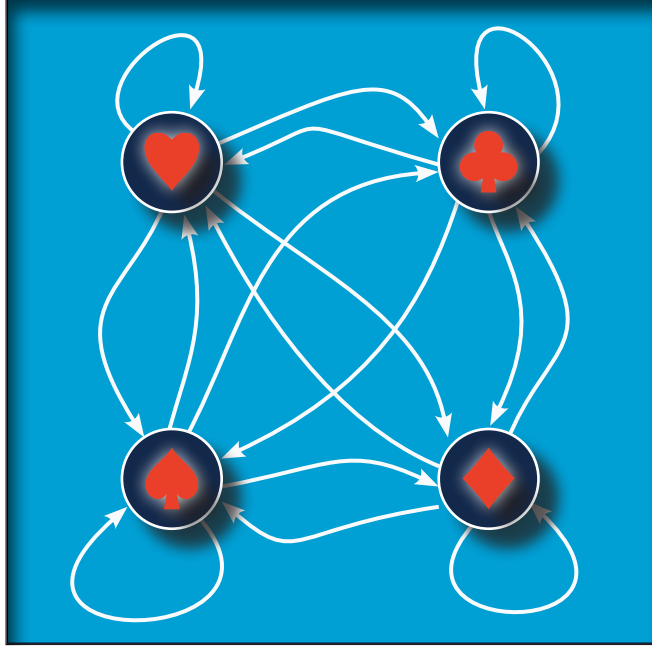
necessary for **PASS**: get 5

sufficient for one **ALMA**: get 8

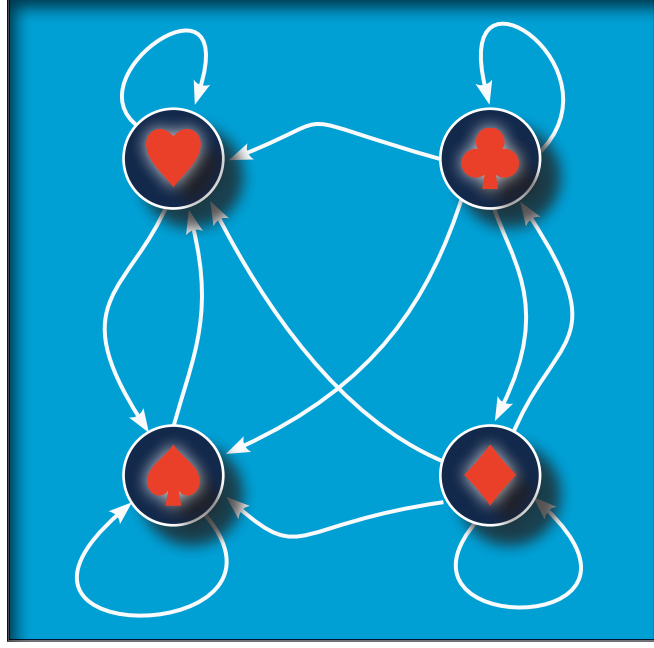
Senator 3: Oikos



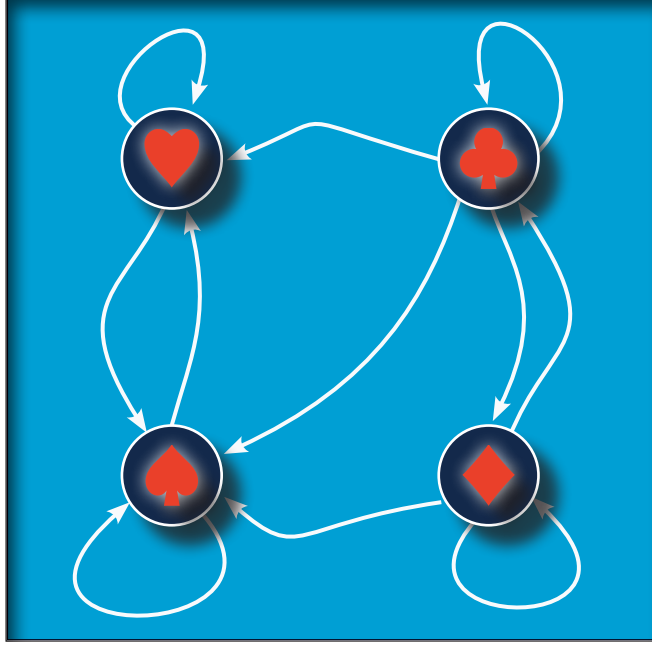
Senator 4: Ephesus



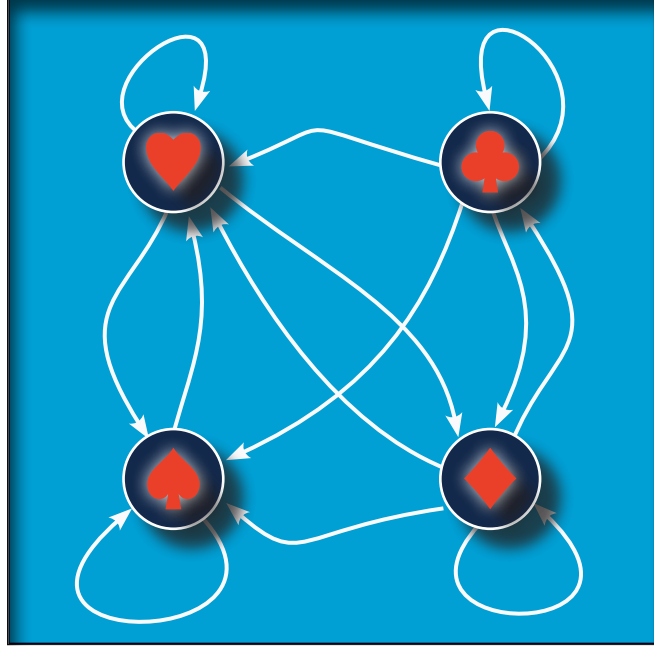
Senator 5: Próti Flóga



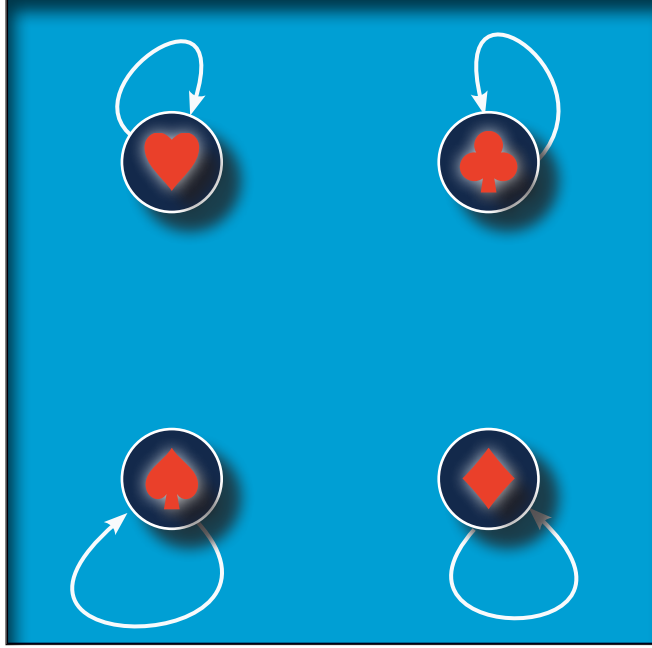
Senator 6: Spíti-ton-Archónton



Senator 7: Elis



Senator 8: Chalcis



Meanwhile, it seems to me that Vesta Diaphthora is up to something. I mean, it's *possible* that one politician could keep getting her way again, and again, and again, and again...but I'm beginning to have my doubts. I think Vesta's just more clever than most, and better at using the rules to her advantage. I've been thinking this for a while now, so let me talk you through my logic.

Generally speaking, the Diva would like to not have to vote: the legitimacy of the office lies in being the sort of first among equals who recuses whenever possible. Since there are only eight provinces, however, ties are bound to pop up now and again, and this is where the Diva most often uses her voting rights. Yet, most of the decisions made by the Hestallan Council involve a strict majority of the provincial senators voting in the same direction, so the Diva doesn't vote very often unless she wants to go on the record about something.

Now, the Diva's only special power lies in the fact that she sets the agenda: she is the one that determine which two policies are pitted against one another for voting purposes. So for example:

- if there are two alternatives under consideration, the Diva has no power, and the choice is made between the two via majority rule.
- if there are three alternatives under consideration, the Diva chooses an initial pair of alternatives, one of which is chosen via majority rule; the alternative that wins this first round is then pitted against the remaining alternative, with the choice again made via majority rule.
- if there are four alternatives under consideration, the Diva chooses an initial pair, the winner of which is pitted against a third alternative chosen by the Diva, and the winner of that second round is then pitted against the remaining alternative.
- and so on.

The only constraint on the Diva's agenda-setting power is the fact that she must include all alternatives in her sequence of votes; this ensures that all policies are given consideration and a chance to pass. Or does it?

After the embarrassment of so many senators' failure to abide the Hestallan Rules, several new senators were elected to the council. After this election, each senator followed the Hestallan Rules and had preferences as follows:

A & E	O & F	StA & L	PF & C
♦	♥	♣	♠
♥	♣	♠	♦
♣	♠	♦	♥
♠	♦	♥	♣

In other words, the new senators from Andros and Ermioni had the same preferences, and these set $\diamond > \heartsuit > \clubsuit > \spadesuit$. Similarly, the new senators from Oikos and Ephesus had the same preferences, and these set $\heartsuit > \clubsuit > \spadesuit > \diamond$. And so on: each senator has a twin, and their preferences can be read top-to-bottom.

1. Let's remove Vesta from the conversation at the moment. Draw a preference doodle that represents the "unled council's preferences via majority rule", where there is an arrow from one alternative (call it x) to another alternative (call it y) if and only if at least four senators have x at least as good as y .
2. Does this doodle satisfy the Hestallan Rules? Why or why not?
3. Is it TRUE or FALSE that: for all alternatives x , there exists at least one other alternative y such that the council strictly prefers x to y ?
4. Is it TRUE or FALSE that: there exists an alternative that the council strictly prefers to all other alternatives?
5. Suppose that Vesta's favorite alternative is \spadesuit . Could she ensure that \spadesuit wins over all other alternatives by voting for \spadesuit ?
6. Suppose that \spadesuit is a controversial policy that Vesta would rather not vote for in public. Does there exist an agenda (i.e., a sequence of pairs of alternatives as described on the last page) that ensures that \spadesuit is chosen even if she doesn't vote?

Did I mention that I hate Hestallum? I hate Hestallum. Diva Defending Democracy, *my ass!*

necessary for **PASS**: get 3

sufficient for one **ALMA**: get 6

sufficient for a second **ALMA**: in 1000 or so words, answer the following: what do you make of the fact that a society comprised of "rational" individuals that makes choices via majority rule could be...not rational? Can you think of a rule other than majority rule that might ensure that society is as rational as her constituents? Hint: you might want to perform an internet search for "social choice theory" or "Arrow's Theorem" or "The Chaos Theorem" or "Condorcet's Paradox." And, you know, try not to lose faith in democracy, which remains the worst form of government save for all the others that have been tried.

PART 3 | LITTLE LAELAPS AND THE FOUR BALLS

Sorry, I just got so angry that I had to take Laelaps for a walk around the semicircle. I'm feeling much better now, and he was quite happy to pretend like he's not scared of all the squirrels.

Upon our return, it occurred to me that Laelaps, for all his limitations, might be a better decision-maker than those idiots in the Prytaneion. It seemed like a good time to design an experiment: I would take his four favorite toys and present various combinations to him, taking note of which he liked and which he scorned. From this, I could back out something like a set of preferences, and this would be just as subject to the Hestallan Rules as those fancy senators and their fancy opinions.

$$\begin{aligned}
 c(\{\heartsuit, \spadesuit, \clubsuit, \diamondsuit\}) &= \{\heartsuit, \clubsuit\} \\
 c(\{\heartsuit, \spadesuit, \diamondsuit\}) &= \{\heartsuit\} \\
 c(\{\spadesuit, \clubsuit, \diamondsuit\}) &= \{\clubsuit\} \\
 c(\{\heartsuit, \clubsuit, \diamondsuit\}) &= \{\heartsuit, \clubsuit\} \\
 c(\{\spadesuit, \clubsuit, \diamondsuit\}) &= \{\clubsuit\} \\
 c(\{\heartsuit, \clubsuit, \spadesuit\}) &= \{\heartsuit, \clubsuit\} \\
 c(\{\spadesuit, \diamondsuit\}) &= \{\diamondsuit, \spadesuit\}
 \end{aligned}$$

More provocatively: since we can model the motion of things using calculus in a three-dimensional space, do we have to assume that ball-catching dogs know calculus to model them using calculus? Does the calculus belong to the student or the thing the student studies?

1. Draw a preference doodle where there is an arrow going from ball x to ball y if and only if there exists a menu containing both x and y where x is in the choice set.
2. Does this doodle satisfy the Hestallan Rules? Why or why not?
3. Does Laelaps's choice mapping satisfy the Weak Axiom of Revealed Preference?

necessary for **PASS**: get 1

sufficient for one **ALMA**: get 3

sufficient for a second **ALMA**: what would have to be true for completeness and transitivity to align with WARP? Hint: it's about the set of menus you've got to work with.