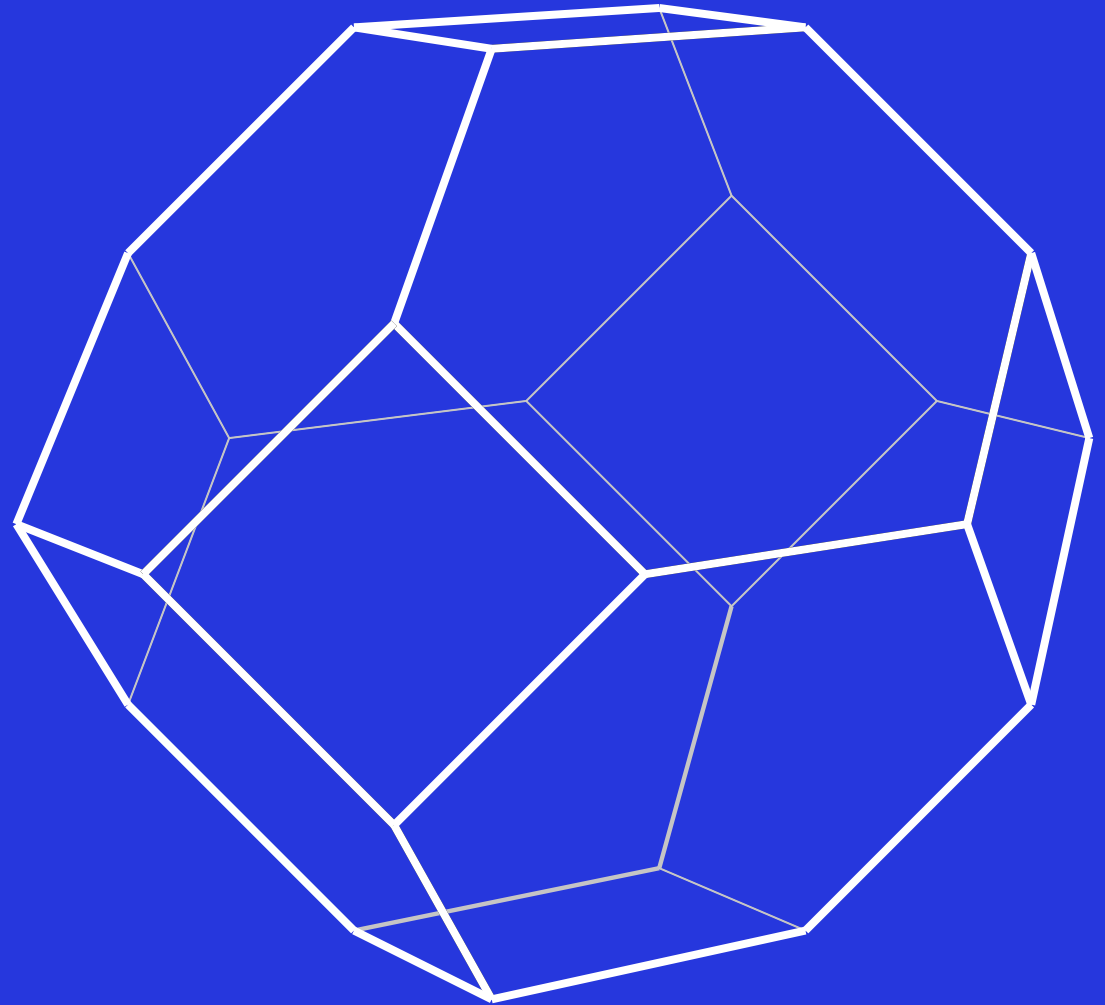


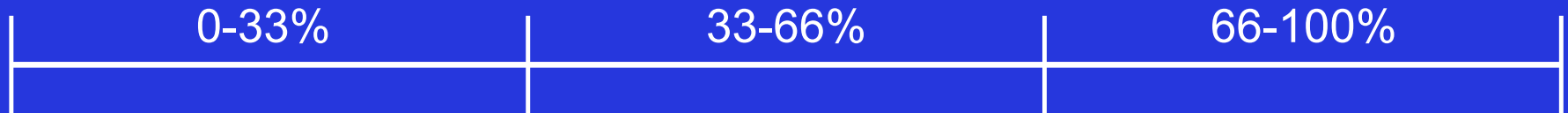
Minimal Experiments

Healy, Leo





Will the Braves Win the World Series?



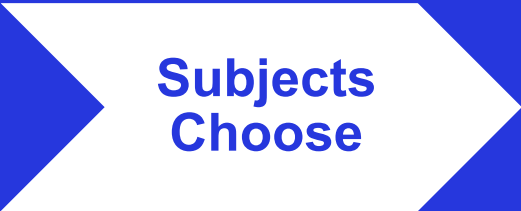
What's the simplest experiment that learns this info?

Choice-from-Sets Experiments.

**Determine
Menus**



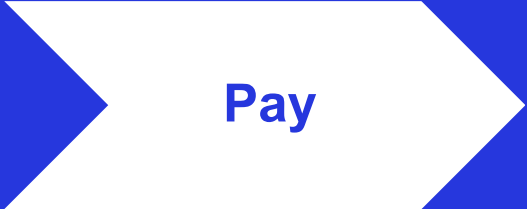
Choice-from-Sets Experiments.



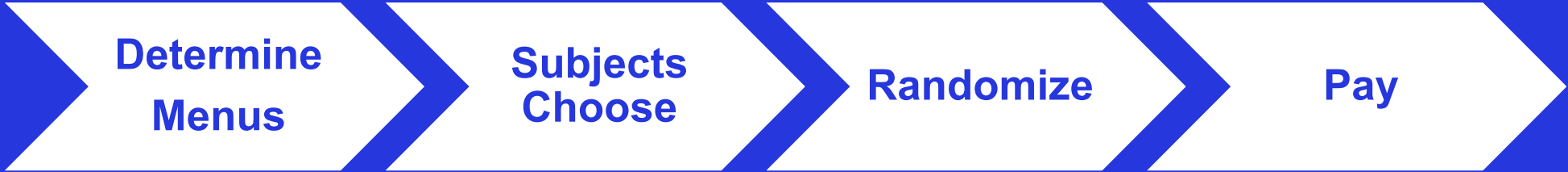
Choice-from-Sets Experiments.



Choice-from-Sets Experiments.



Choice-from-Sets Experiments.



Simplest- Fewest Sets

This block illustrates a menu design labeled "Simplest- Fewest Sets". It features a white border and contains icons for a gingerbread man, an apple, and a banana. The gingerbread man, apple, and banana are arranged in a top row, while the apple and banana are arranged in a bottom row.

This block shows a menu with icons for a gingerbread man, an apple, and a banana in the top row, and an apple and a banana in the bottom row. The gingerbread man, the bottom apple, and the bottom banana are highlighted in pink.

This block shows a menu with icons for a gingerbread man, an apple, and a banana in a single row. The gingerbread man, the apple, and the banana are highlighted in pink.

This block shows a menu with a single icon of a gingerbread man, which is highlighted in pink.



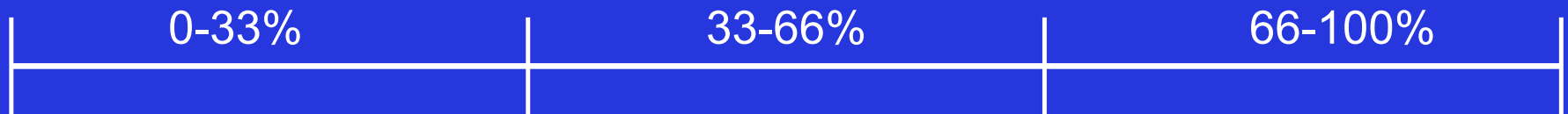
0-33%

33-66%

66-100%



\$10 if *Braves Win*, \$10 if *Astros Win*, \$10 with **66%**





0-25%

25-50%

50-75%

75-100%



\$10 if *Braves*, \$10 if *Astros*, \$10 with **75%**

\$10 if *Braves*, \$10 with **50%**

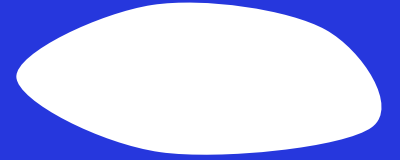


*Everyone likes
cookies better than
apples and
bananas.*





Everyone either likes dates best and anyone who doesn't like dates best likes cookies best and dates worst.





The General Method

Objects.

Can be anything.

- *Lotteries*
- *Consumption Goods*
- *Time-dated payments*
- *Strategies in a game*
- *Multi-person payments*
- *...*

In general: *A, B, C, D, ...*

Rankings.

ABC,ACB,BAC,BCA,CAB,CBA

Model (or, “Type Space”).

$\{CAB, CBA\}, \{ABC, ACB, BAC, BCA\}$

Everyone likes cookies better than apples and bananas.

Option 1: Testing the Theory.

{CAB,CBA},{ABC,ACB,BAC,BCA}

Everyone likes cookies better than apples and bananas.

Option 2: Categorize Subjects (& Test).

$\{DABC, DACB, DBAC, DBCA, DCAB, DCBA\}, \{CBAD, CABD\}, \{Rest\}$

Everyone likes dates best, or cookies best and dates worst.

Option 3: Categorize, Assume Theory True

{DABC,DACB,DBAC,DBCA,DCAB,DCBA},{CBAD,CABD}

Q: What's the "smallest" experiment that accomplishes your goal?

How many possible experiments are there?

$N=3$

127

N=9

6,703,903,964,971,298,549,787,012,499,102,923,063,739,682,910,296
,196,688,861,780,721,860,882,015,036,773,488,400,937,149,083,451,
713,845,015,929,093,243,025,426,876,941,405,973,284,973,216,824,5
03,042,047

Neighbors.

Differ by one Inversion.

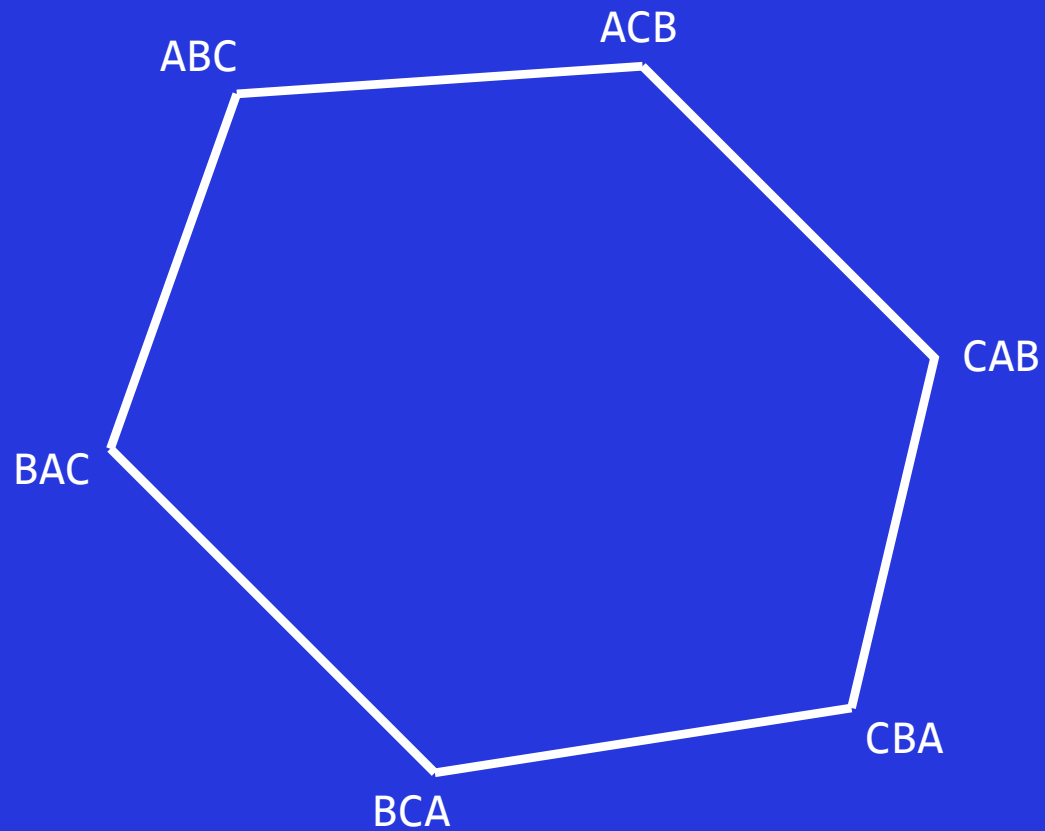
ABC, ACB, BAC, BCA, CAB, CBA

Neighbors.

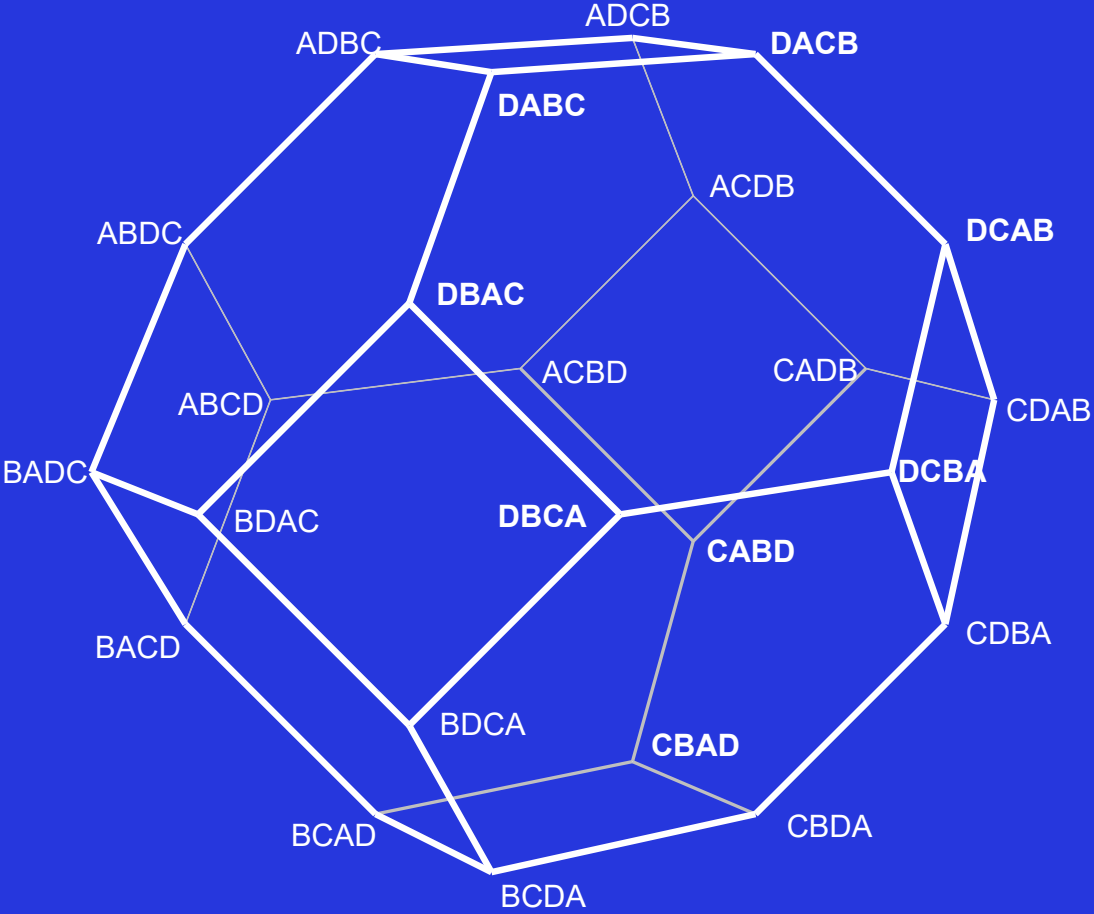
Differ by one Inversion.

ABC, ACB, BAC, BCA, CAB, CBA

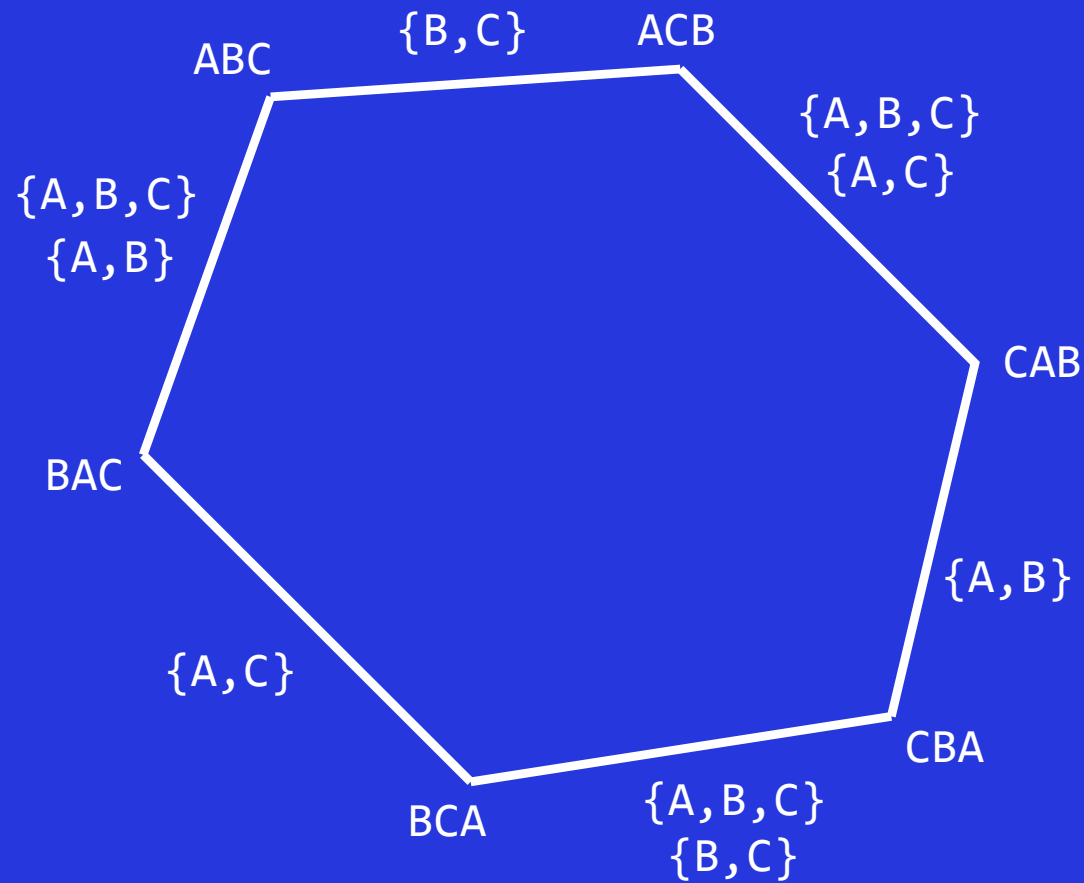
Permutahedron.



Permutahedron.



Differentiating Vertices.

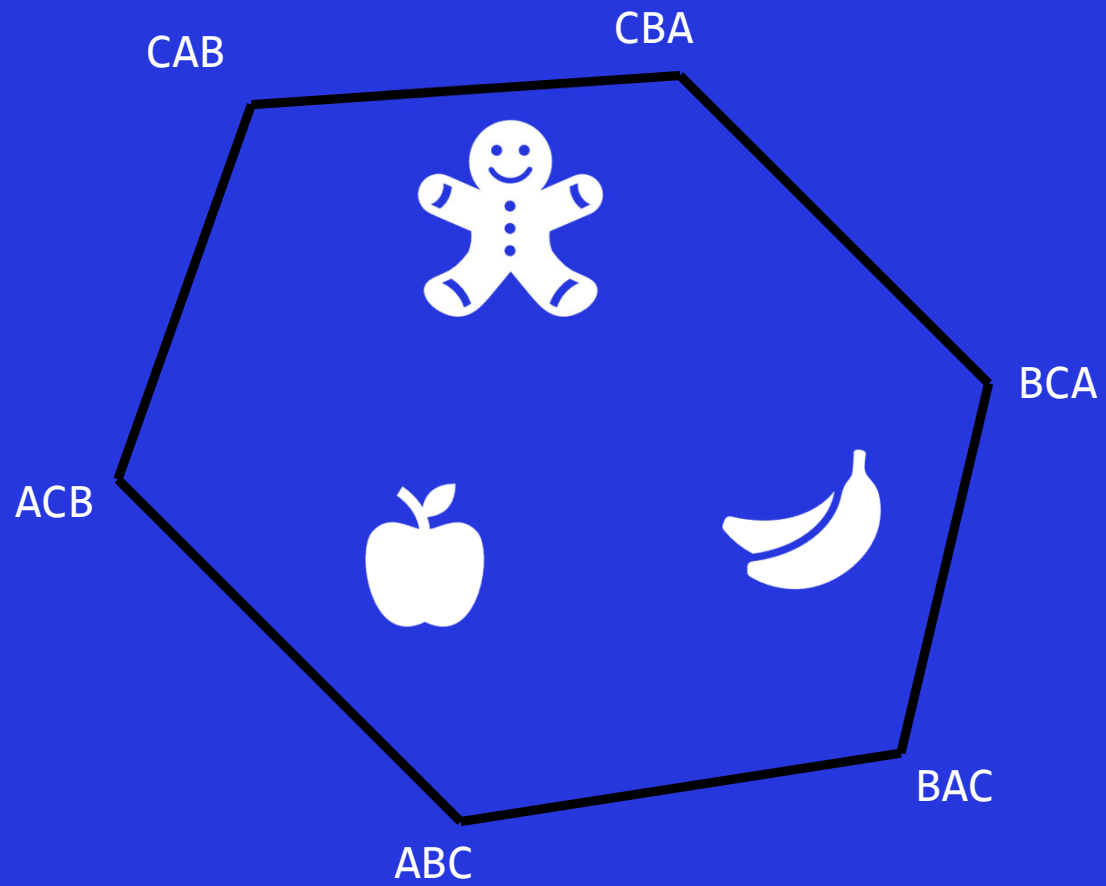


Theorem.

An experiment tests a model M :

if and only if

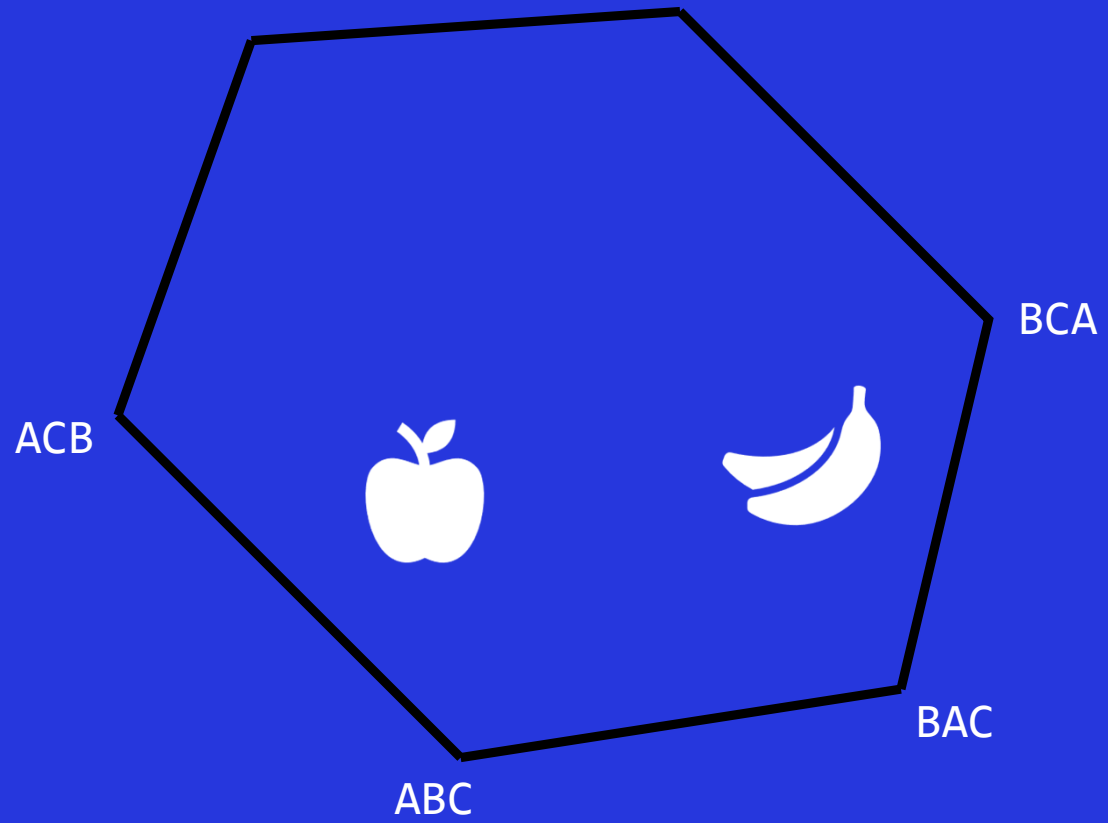
it includes *at least one set* from each edge between *neighbors* that are *not in the same set* under M .

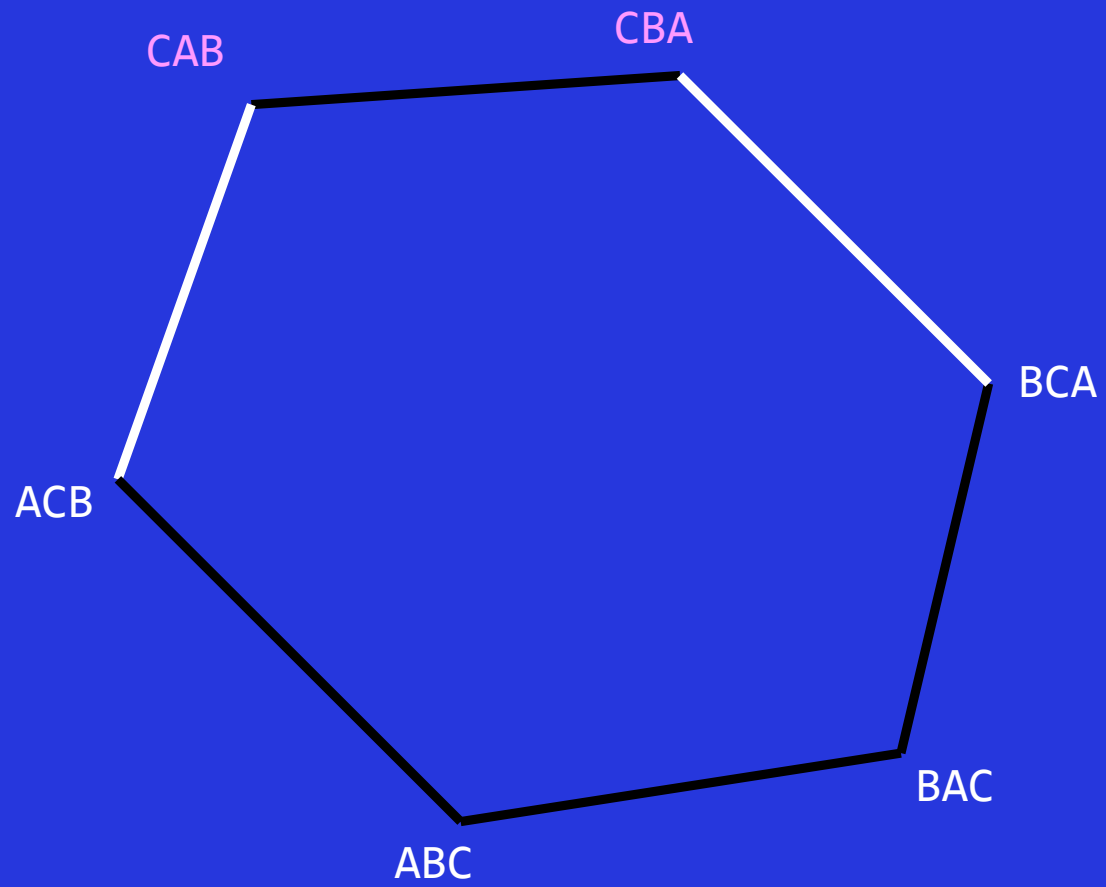


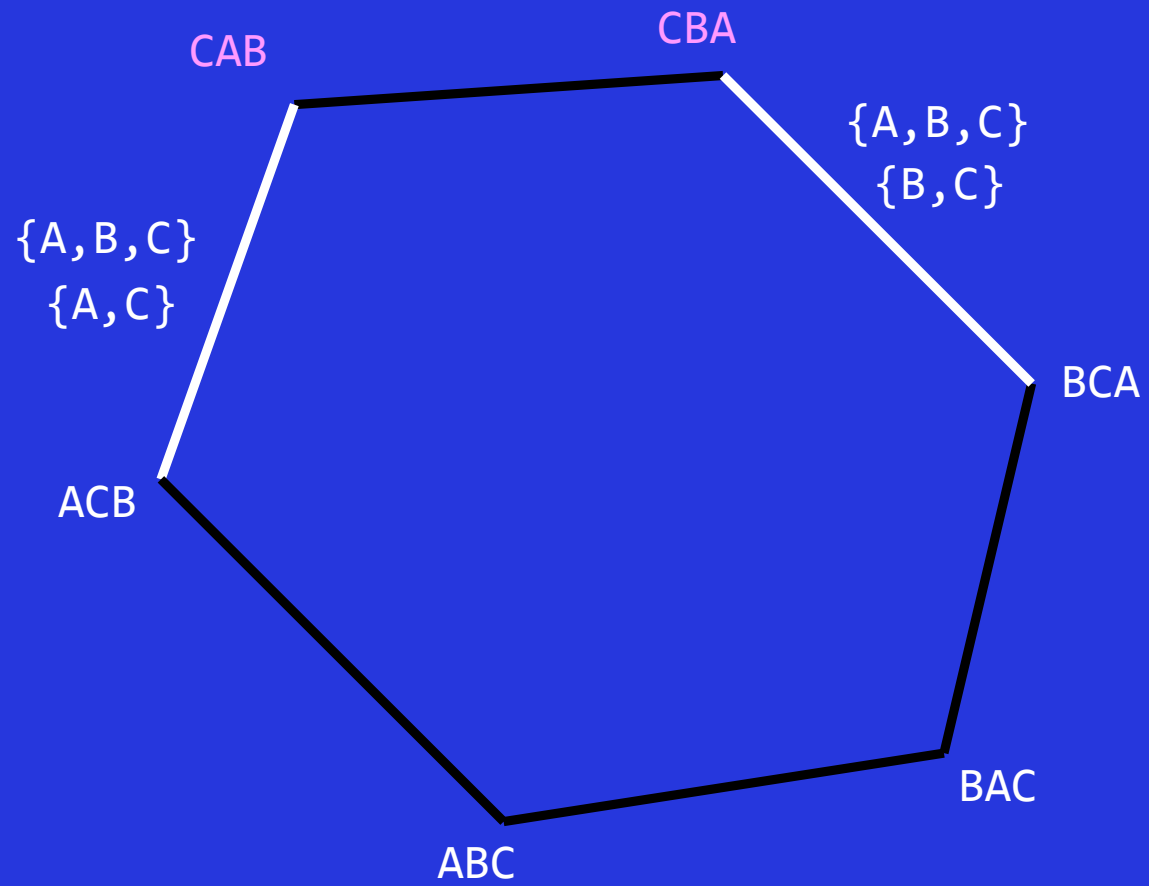
CAB

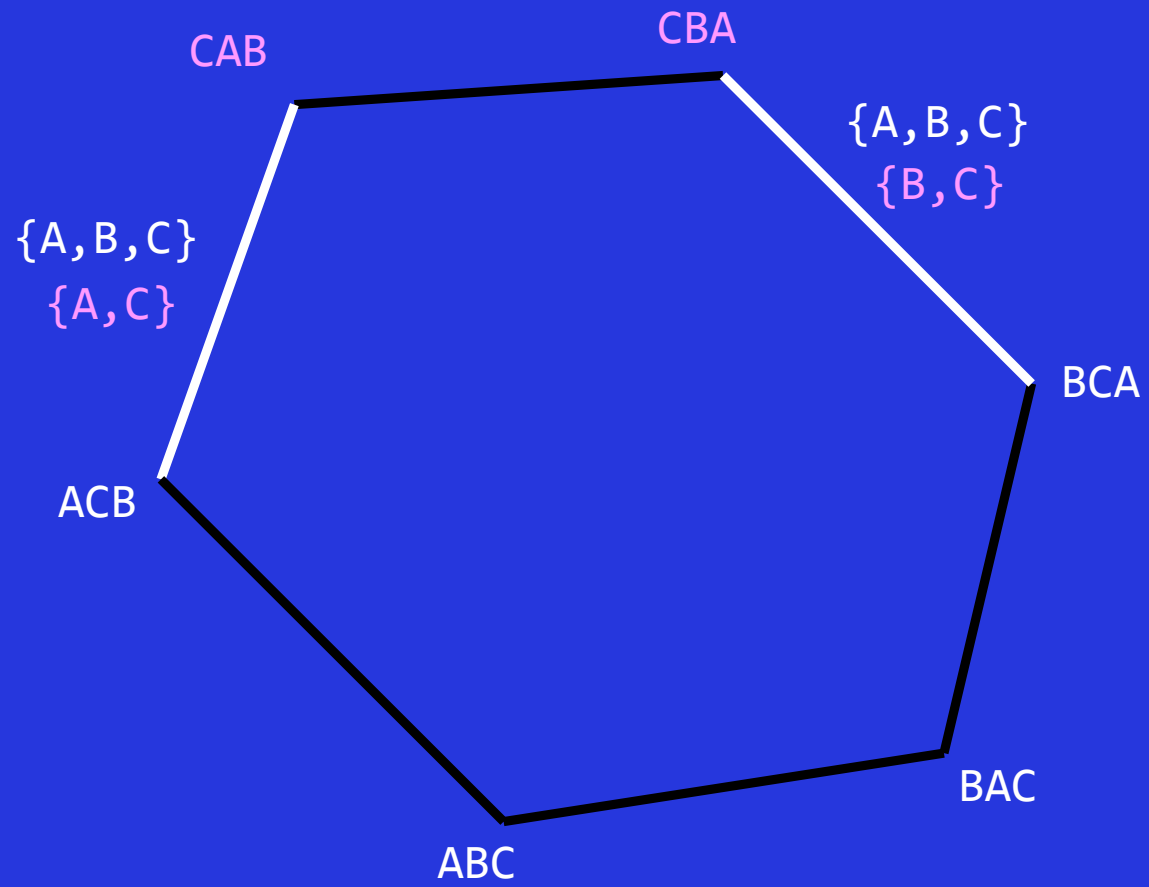
CBA

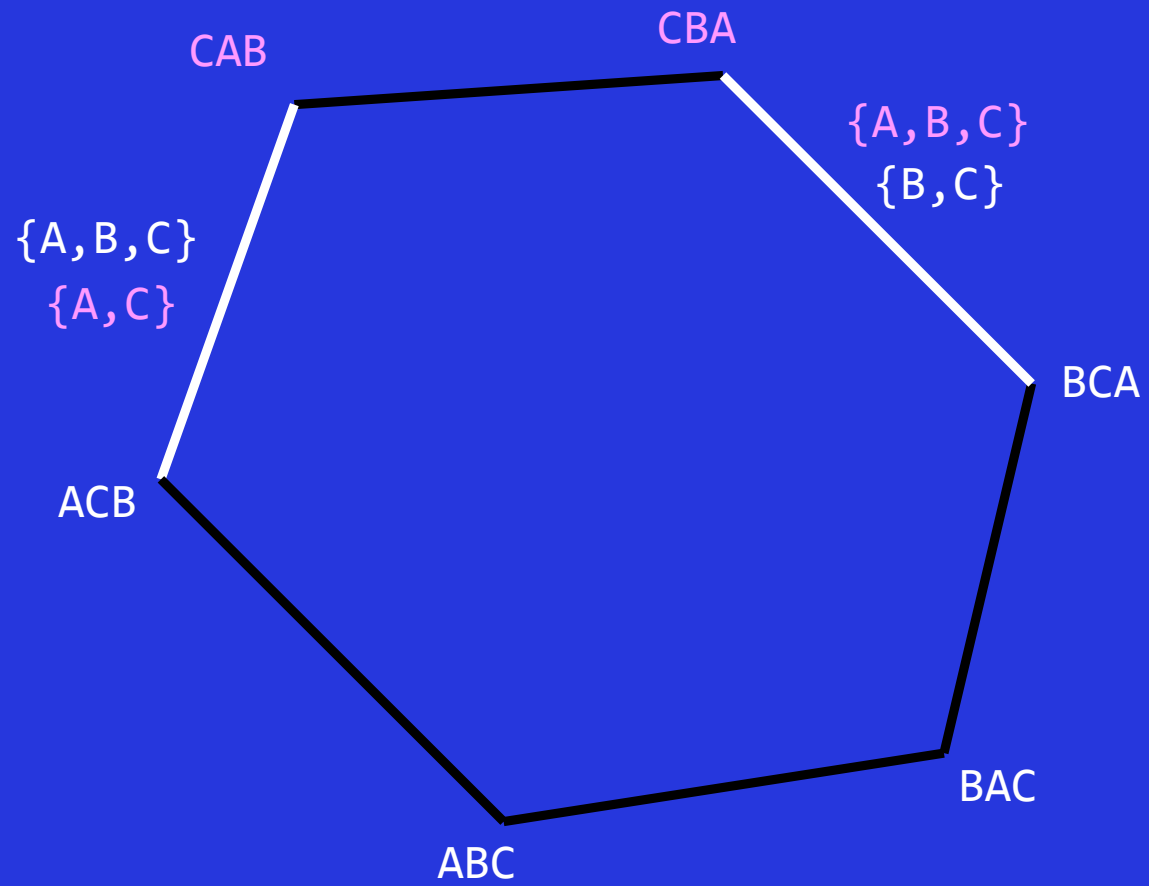


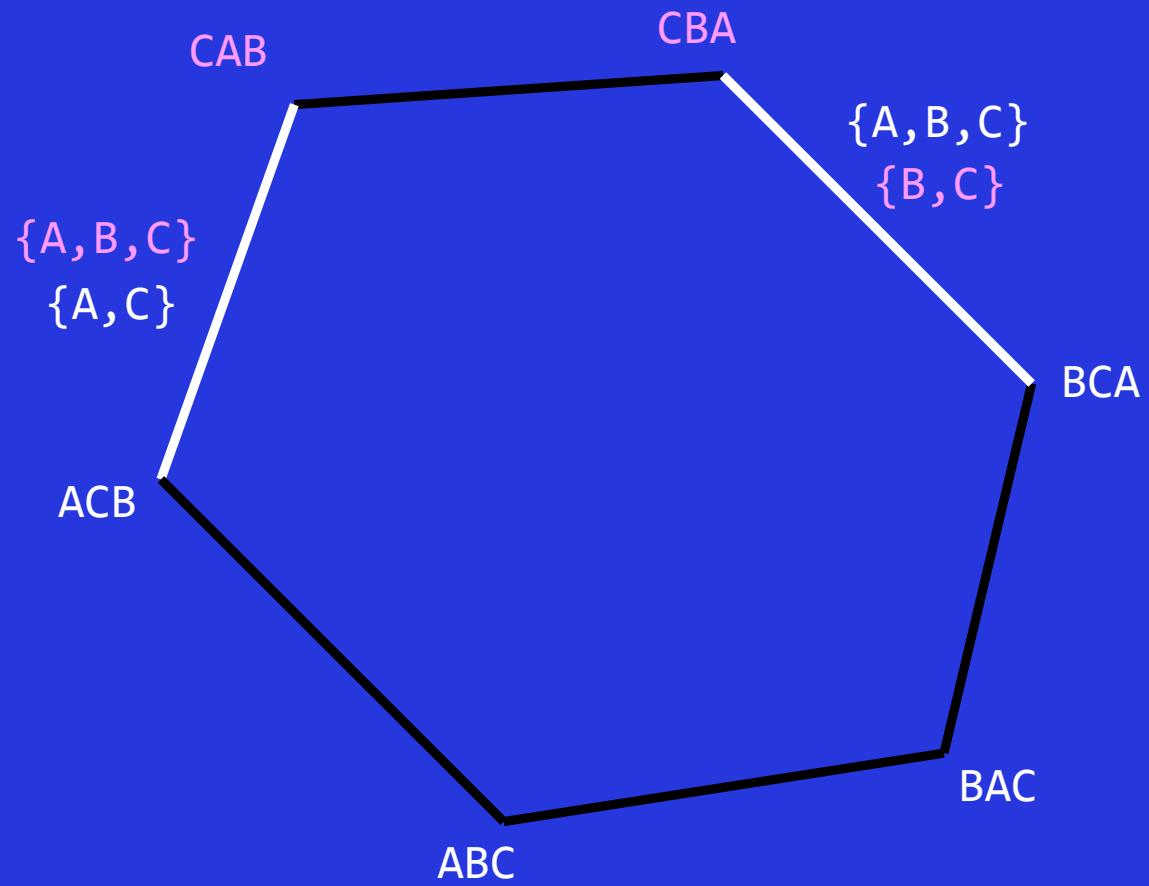


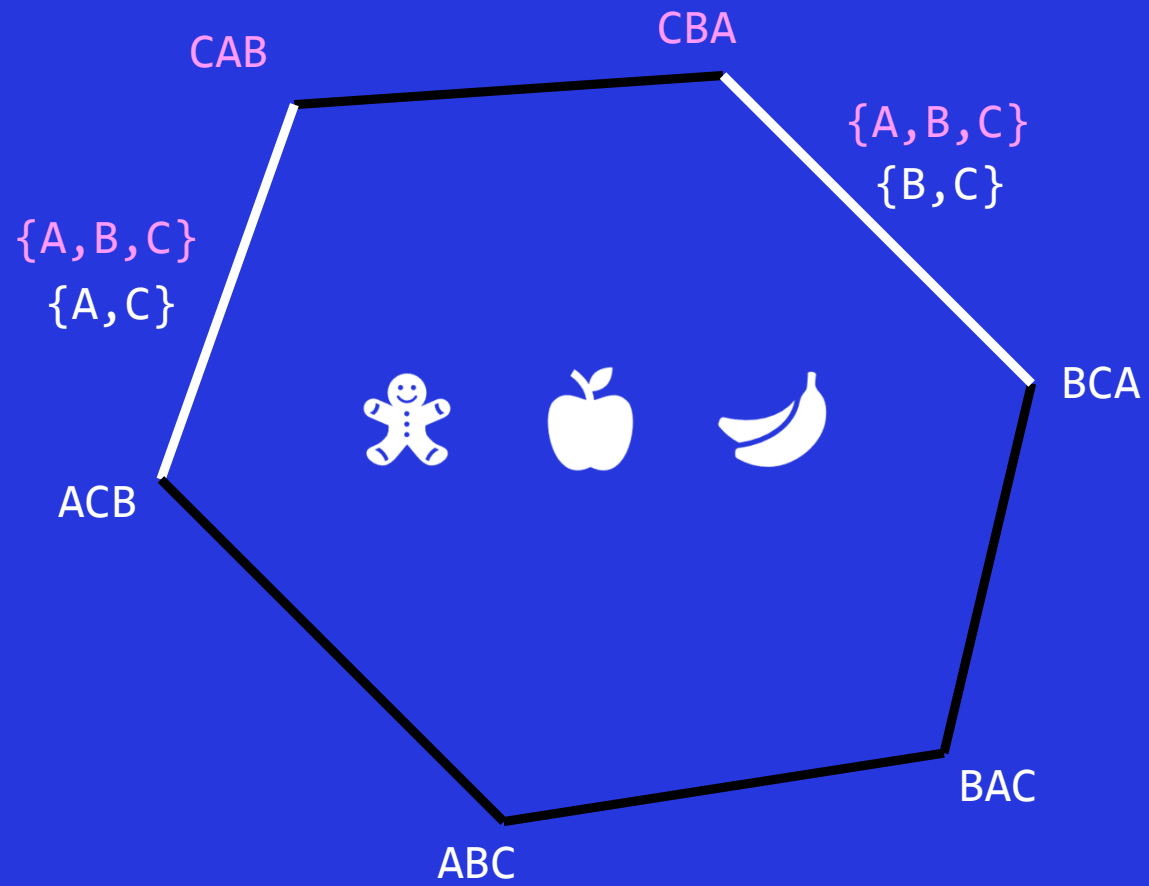








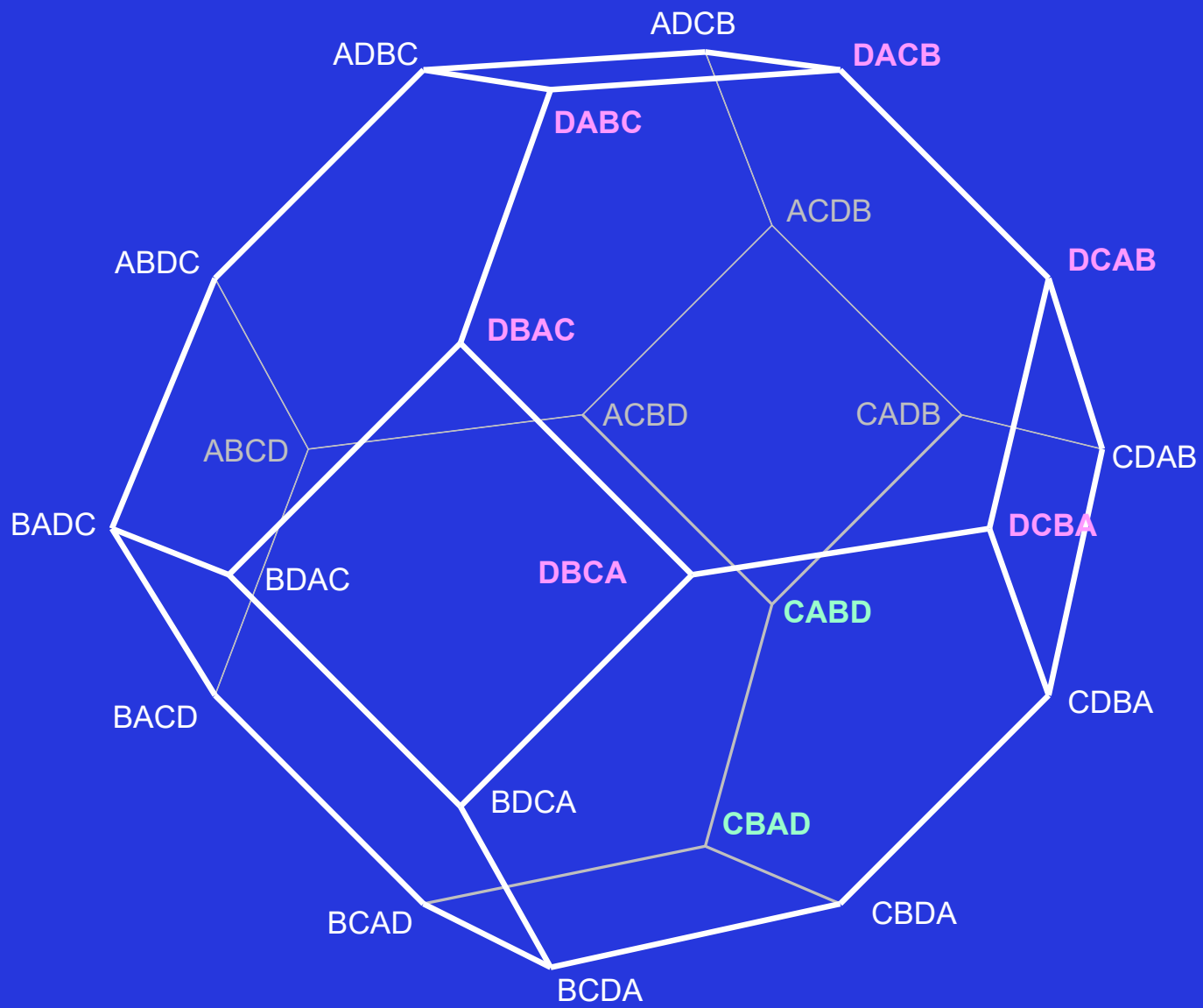


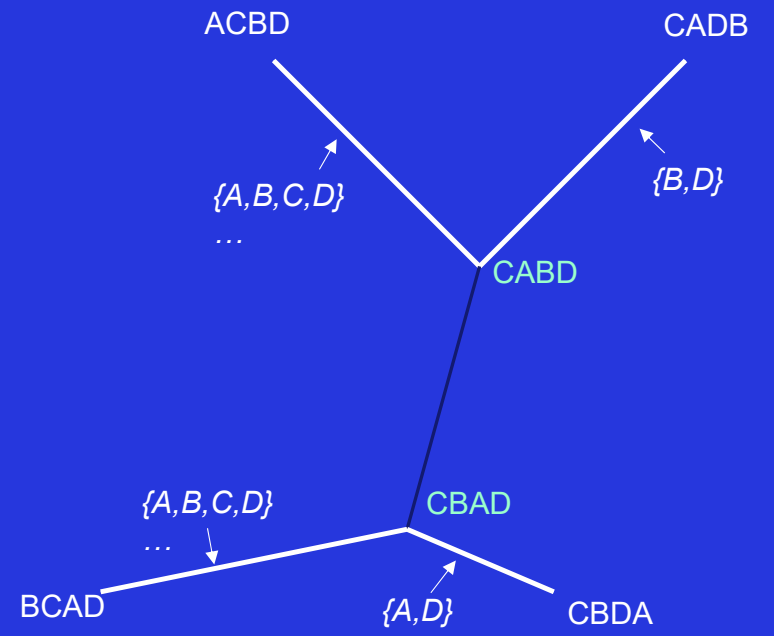


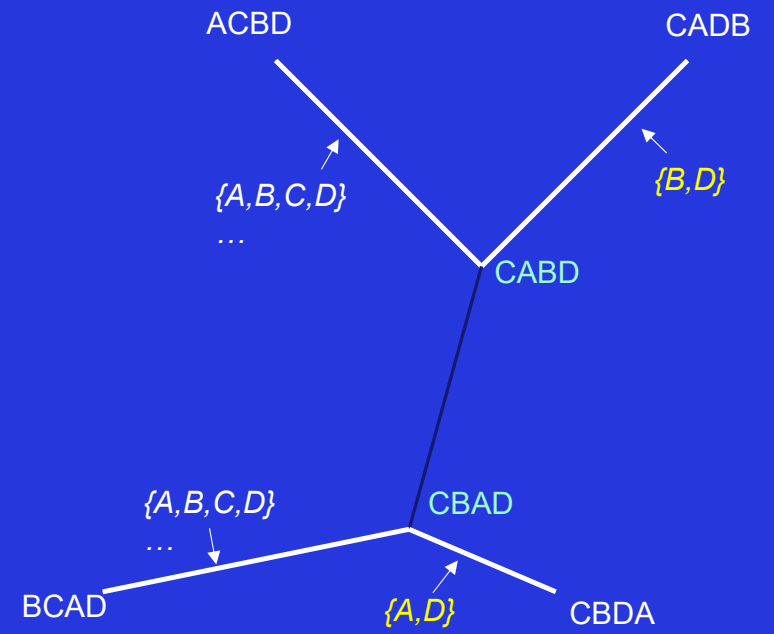
Cookies and Dates.

$\{A, B, C, D\}, \{A, D\}, \{B, D\}$

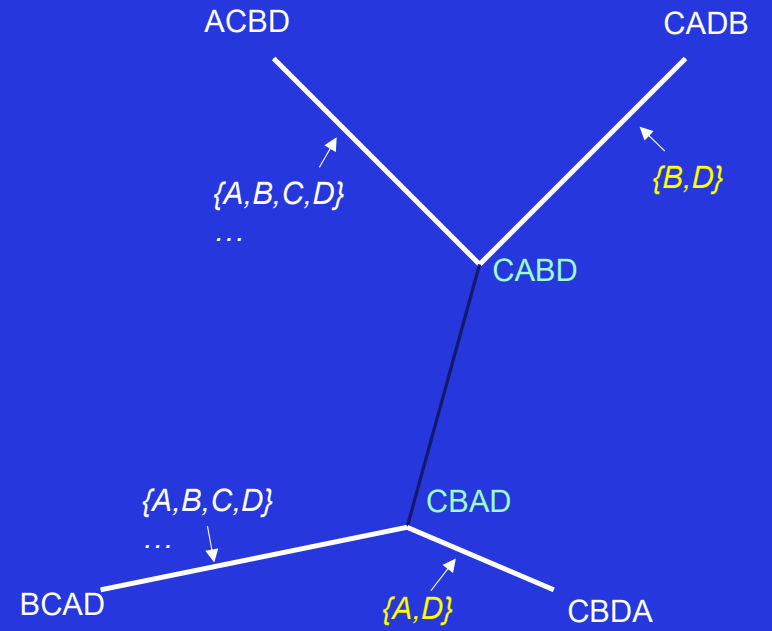
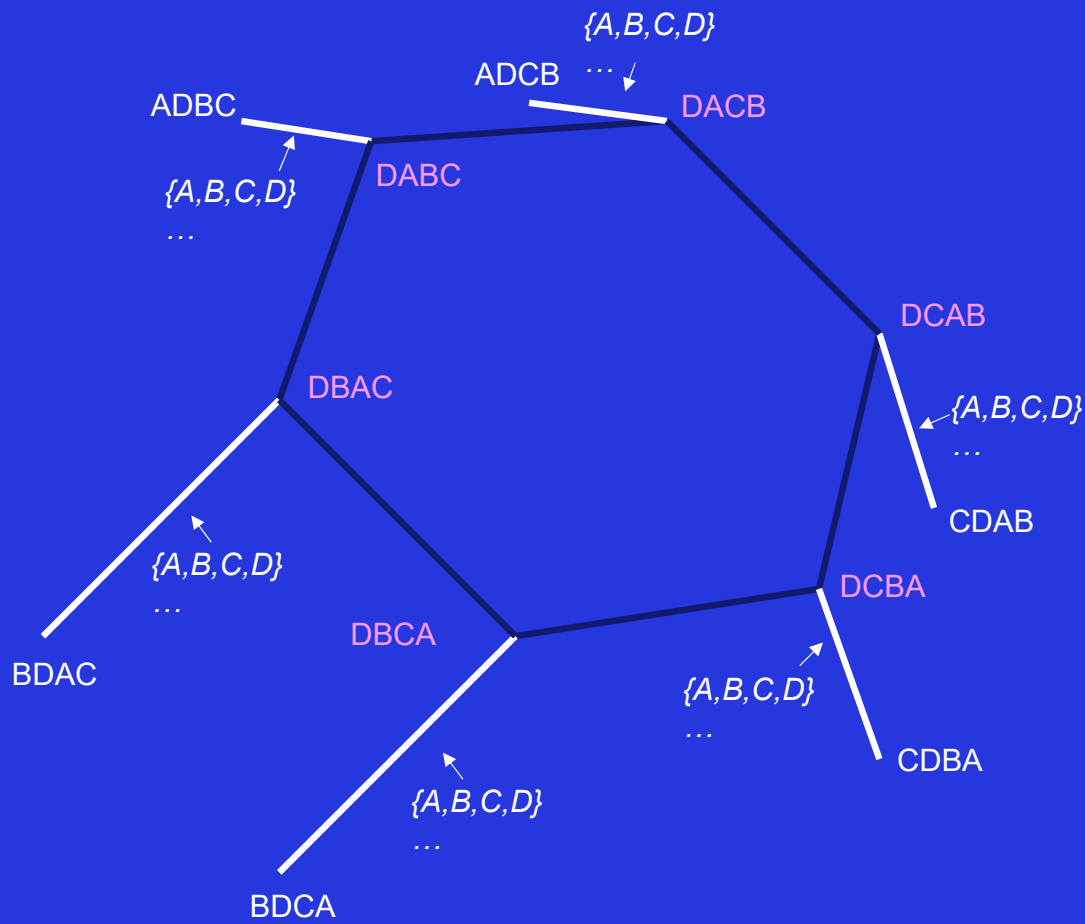




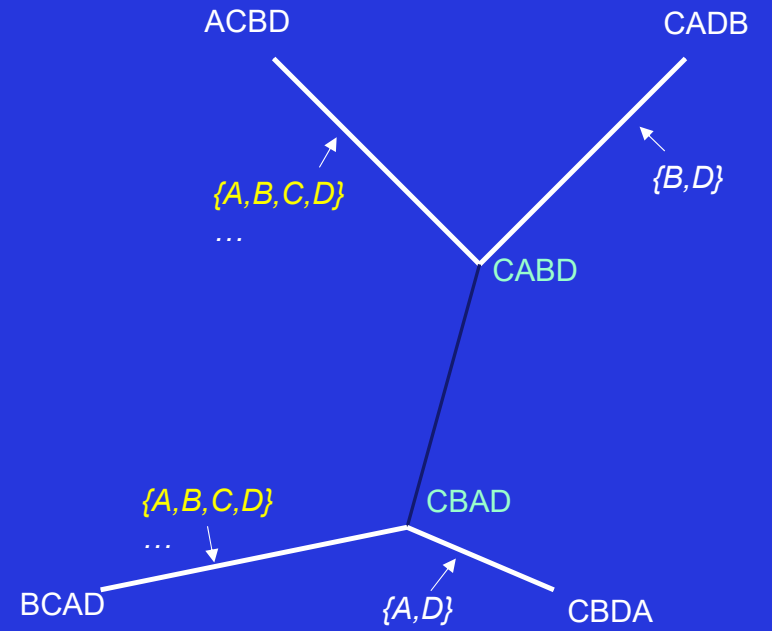
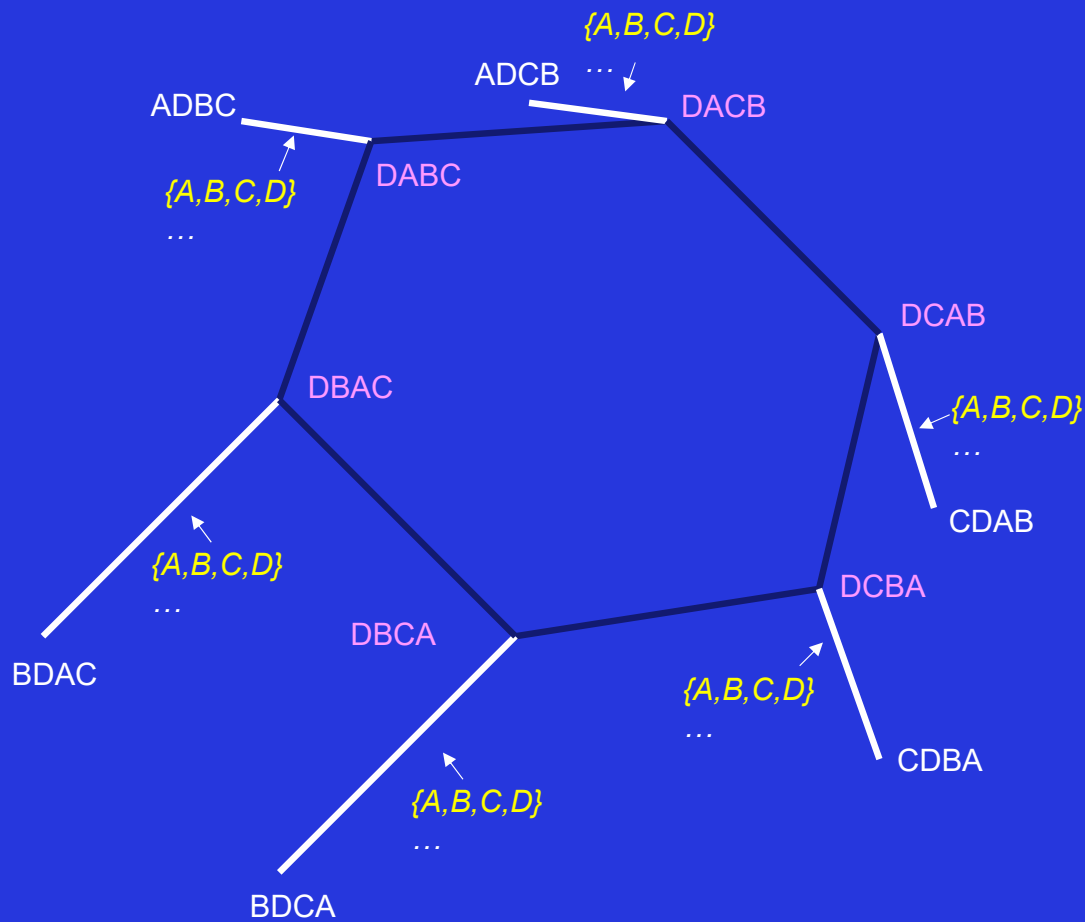




$\{A, D\}, \{B, D\}$

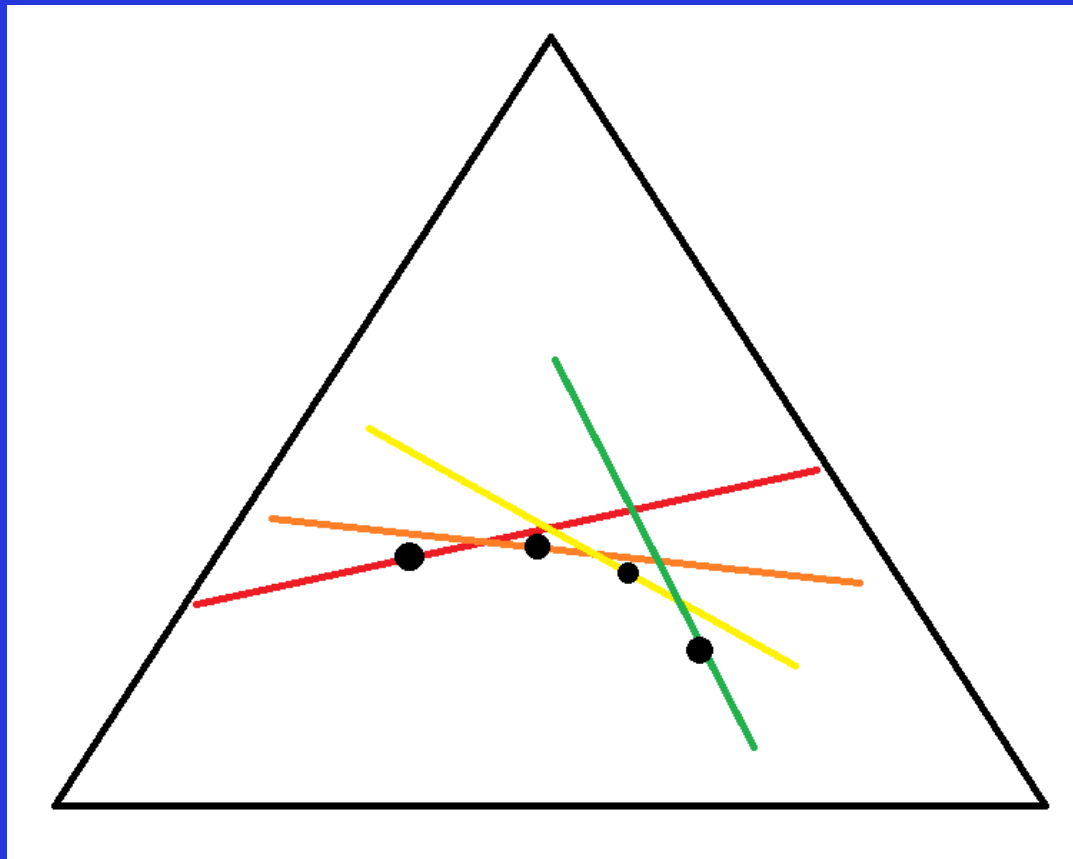


$\{A, D\}, \{B, D\}$

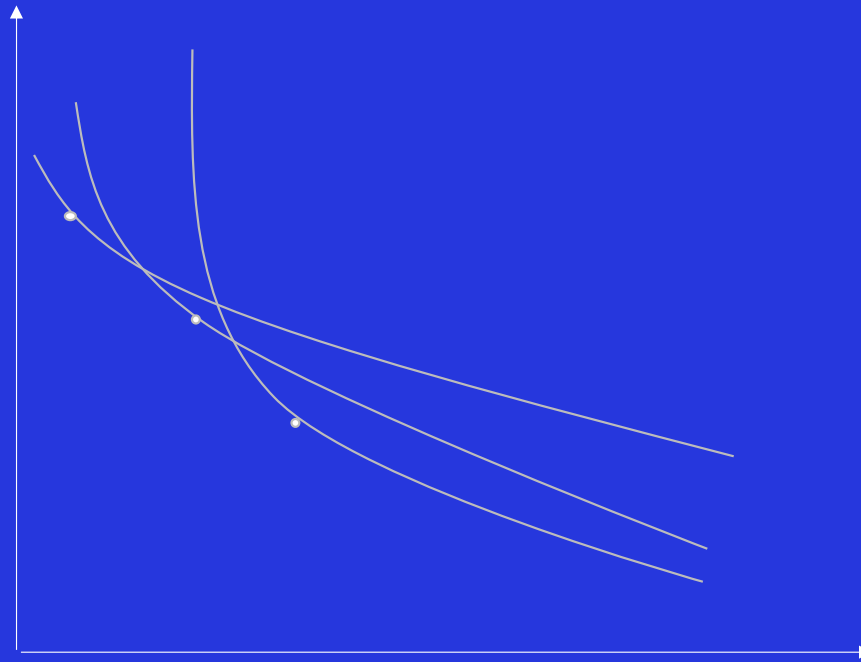


$\{A, B, C, D\}, \{A, D\}, \{B, D\}$

Parametric Utility Example: Risk Prefs



Parametric Utility Example: R^2



The App

- <https://gregleo-econ.shinyapps.io/minimalexperiments/>