MA111: Contemporary mathematics

Entrance Slip (due 5 min past the hour):

Five friends are trying to decide on where to have lunch.

| | Avery | Blair | Casey | Dee | Elisha | |
|----------|-----------|-----------|-----------|-----------|-----------|--|
| Favorite | Ovid's | Ovid's | Ovid's | K-Lair | K-Lair | |
| Fine | K-Lair | K-Lair | K-Lair | Starbucks | Starbucks | |
| Least | Starbucks | Starbucks | Starbucks | Ovid's | Ovid's | |

If they only go to one location for lunch, which location will make the group happiest? Explain why.

Schedule:

- HW 1 is due 7am Tuesday, Sep 9th, 2014
- Mini-exam 1 is in-class on Thursday, Sep 11th, 2014
- HW 2 is due 7am Tuesday, Sep 16th, 2014
- HW 3 is due 7am Tuesday, Sep 23rd, 2014
- Exam 1 is in-class on Thursday, Sep 25th, 2014

Today we try to get more specific with our rules

Schedule for today

- Please turn in your entrance slips. We will do this every non-exam day. Please bring your own 3x5 index cards.
- Work in groups of 3-6 (probably your table is 3, and you can combine 2 tables if you want)
- After 5 minutes will present some answers
- Next we'll get back into groups to critique the answers, and then present again
- Then I'll go over the old-ideas quickly
- Finally we have the exit quiz (last 10 minutes of class)

Activity: The winner depends on the rules

- Last class we had two very wise things said:
- We often want a medium candidate (not someone half-hated and half-loved)
- The majority rules (most of the time)
- On the quiz: which candidate was preferred by the majority?
- On the quiz: which was the medium candidate?

 Most of the homework will focus on old ideas (the exams will include our new ideas too)

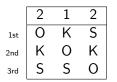
• Sometimes the hardest part in answering a question is understanding what it is asking. What do the words mean?

• I want us all to have a common understanding of some words. You can think of them as a foreign language that only uses English words in funny ways.

Today's words

- A **ballot** is an ordered list of possibilities.
- A **preference schedule** counts how many ballots of each type there are.

| | Avery | Blair | Casey | Dee | Elisha | |
|----------------|-----------|-----------|-----------|-----------|-----------|--|
| Favorite | Ovid's | K-Lair | Starbucks | Ovid's | Starbucks | |
| | K-Lair | Ovid's | K-Lair | K-Lair | K-Lair | |
| Least favorite | Starbucks | Starbucks | Ovid's | Starbucks | Ovid's | |



• I'll use words like "favorite" and "first place vote"

- A **voting method** takes a preference schedule and returns a single ballot for the group
- The **plurality method** just counts first place votes. Whoever has the most "favorites" on the individual ballots will be the favorite on the group's summary ballot
- A majority winner is a possibility that has more than half of the first place votes.
- Groups that have a majority winner are much easier to summarize than ones that don't

Voting methods using points

- Give points for all votes (more for first, less for second, etc.), order choices by number of points
- **Standard borda count** gives 1 point for every choice at or below. So if 5 choices, 1st place gets 5, 2nd place gets 4, 3rd place gets 3, 4th place gets 2, and 5th place gets 1
- **Daisia's rule** gives 1 point for 1st, 1 point for 2nd, and none otherwise
- "Soccer" variation gives 3 for 1st, 1 for 2nd, and none otherwise.
- Plurality gives 1 point for 1st, and none otherwise

Elimination methods

- Elimination: Use a voting method to find the worst choice, eliminate it, and start over. Continue until you have a winner.
- **Standard elimination** uses plurality to choose the loser (least first place votes).
- **Robin's rule** requires us to eliminate anyone who has the majority of last place votes
- Reality TV typically eliminates most last place votes (even if not a majority)

Exit quiz

• A group is trying to decide on lunch.

| Alex | | Blake | | Charlie | | Dak | Dakota | | Emory | |
|------|---|-------|---|---------|---|-----|--------|-----|-------|--|
| 1st | 0 | 1st | 0 | 1st | 0 | 1st | 0 | 1st | Κ | |
| 2nd | K | 2nd | Κ | 2nd | Κ | 2nd | K | 2nd | S | |
| 3rd | S | 3rd | S | 3rd | S | 3rd | S | 3rd | 0 | |

- If they use the Soccer rule, how many points does each candidate get? Label them and circle the winner.
- If they use Daisia's rule, how many points does each candidate get? Label them and circle the winner
- How does Emory feel about the soccer rule?