Final Projects

MATH 130

Expectations

1. Groups should have 3 or 4 members, but 2-5 is acceptable as long as each member contributes fairly.

2. Each member will have 7 minutes to present their portion. These need not be contiguous; each member could present in two 3.5-minute segments, for example, or whatever arrangement makes sense for your topic. (It need not be 7 minutes down to the second, but it should be somewhat close.)

3. Presentations should be in a PowerPoint/Google Slides format unless we arrange otherwise in advance.

4. Each group will share their PowerPoint/Google Slides presentation with me.

5. Each group member will submit a self-assessment of their performance as a group member and the group as a whole. Did everyone do their share? Were disputes resolved effectively and respectfully? Was there one person the bulk of the work fell on? Etc.

6. Each project will be graded out of 200 points according to the rubric on the next page.

7. You should expect there to be questions, at least from me. Part of the rubric includes your handling of questions. Keep in mind that "I don't know" is a valid answer to a question and preferable to providing incorrect information. The goal is to be conversant enough with the material to be able to answer a few questions, however.

8. Also, the "ensemble" part of the grade will be based in part on your self-assessments and in part on my observations of your in-class preparation* and the presentation itself. While all components of your grade depend on the group working together well, all parts except the ensemble part will be graded individually. The ensemble part (20%) is the only part directly tied to your work together.

   *Note that "preparation" is its own category as well; this part is based on your individual contributions to preparation, while the ensemble part is about how you work together.

Next page for possible topics

Some Possible Topics

Each of these topics has numerous resources available; I have listed some. In my experience, Wikipedia is pretty accurate for math stuff but tends to jump to the most general/abstract case pretty quickly, so it is useless unless you are already deep into the subject.

Here are a few topics related to the things we have studied this semester:

- (Luca, Luka, Luis, Mamadou, Gilbert) Penrose tilings **and a new (March 2023) single-shape aperiodic tiling!** (HoM, `https://www.newscientist.com/article/2365363-mathematicians-discover-shape-that-can-tile-a-wall-and-never-repeat/`, `https://arxiv.org/pdf/2303.10798.pdf`)
- 3D tessellations
- (Chloe, Delaney, Salem, Josiah) Graph drawings: planar graphs, Euler's formula (extended), drawings on other surfaces (e.g., donuts or Möbius strips).
- (Lesly, Juno, Allison, Zoie, Kathryn) Graph theory applied to linguistics (`https://www.hse.ru/data/2016/03/13/1124740266/yplm-2015-0005(2).pdf`).
- Graph theory in marketing (paper posted in our WISE site Resources folder if you want to check into it: GT-socialNetworking.pdf).
- Exploration of hyperbolic geometry. (Kay)
- Exploration of spherical geometry; e.g., areas of triangles on the sphere. (Kay)
- (Miranda, Aven, Kristen) The four-color map theorem (delving into the proof somewhat – maybe prove the 5-color theorem?). (`https://www.maa.org/external_archive/devlin/devlin_01_05.html` (expository), `https://nrich.maths.org/6291`, `https://brilliant.org/wiki/four-color-theorem/`)
- (Jack, Noah, Brody) The Collatz conjecture ($3n + 1$ conjecture)
- Other topics are possible; please consult with me if you would like to do something else.
- (Jas, Jasper, Con, Kira) Fractals

Next page for rubric.

	Excellent (90%+)	Good (75-90%)	Fair (60-75%)	Poor (0-60%)
Correctness (40 points)	Mathematics and essential facts are correct.	Most of the mathematics and facts are correct, but there are some small errors.	Most of the mathematics and facts are correct, but there are some significant errors.	Many significant errors.
Clarity (30 points)	Slides and formulas are readable: text is well sized and not too dense, figures are clear, etc. Explanations are clear.	Most slides are readable and explanations are reasonably clear. There may be some minor sources of confusion.	While most of the presentation is clear, there are several confusing points.	Presentation is confusing and slides are hard to follow.
Presentation (40 points)	PowerPoint is free of errors and well organized. Presentation is polished, including timing. Presenters explain the material (not just reading slides to us).	Slides are mostly free of typos and reasonably organized, but there are several errors and/or minor stumbles.	Several typos or slides are not well organized; presentation is rough.	There are many issues with the slides. Presentation does not appear to have been practiced; the presenter is unsure of the material.
Questions (20 points)	All questions are handled well. Presenter is clearly informed about the topic and prepared to address questions.	Most questions are handled well, but there are some minor misunderstandings of the material.	There are several errors in responses; presenter does not seem fully prepared for questions.	Presenter does not appear adequately prepared to handle questions.
Preparation (30 points)	Member assisted * fully in research, creating slides, and coordinating w/ the group	Assisted significantly	Assisted partially	Assisted minimally
Ensemble (40 points)	Presentation moves smoothly forward from person to person. Each team member did a fair share of the preparation and of the presentation. Self-assessment is complete and all members agree that the workload was evenly divided.	Some small hiccups in transitions. The workload was fairly even, but a subset of the group did measurably more than the rest. Self-assessments are complete, but there is some indication that the workload was not evenly divided.	Team interrupted each other. Some presenters were much more prepared than others, leading to weak points in the presentation. A subset of the group did significantly more than the rest. Self-assessments note problems in the group effort.	There were many interruptions during the presentation. A subset of the group did the bulk of the work, while the rest did little. The self-assessments show significant issues in the group effort.

* I will base this on what I observe in class during our last two weeks. Absences in that time will be reflected here.