Матн	2110
MAIN	2110

Your last task this semester is a small project. You will pick a topic related to, but yet, a little beyond what was covered in class. Then you will write up your findings and record a short presentation.

<u>Due Date</u>: Your handout, slides, and recorded presentation are due no later than... Wednesday, December 9th at noon.

Here is what I expect from you (and what you will be graded on):

- Project Selection: Pick out a topic and outline what you plan to study. If you pick something off my list of suggestions, you should be good to go. If you want to do something different that's fine actually that's awesome! But you should talk to me about your selection to make sure it's appropriate for this project.
- Handout: You are to create a 1 page (front and back) handout to go with your topic. If you want to make it longer, that's ok. But all I'm looking for is one double sided page. This "handout" is what you'd pass out to go with your presentation (if you were giving it to the class in person). Here are some features I will be looking for...

 - Your classmates are your audience. Make sure your handout is understandable from their current level of mathematical education [build on what we covered in class].
 - You should have a title including your name. For example, something like what I have on this page of directions.
 - You should have a list of references (*that you reference somewhere in the handout!*) at the end of your handout. You should have *at a minimum* 3 references. Make sure *at least* 1 reference is a SOLID reference (i.e., something published and peer reviewed like a research article or textbook). This source (see [WIKI]) is not so solid, but this source (see [C]) is.
 - Begin your paper with some background about your topic. you might want to include a little bit of history. If you are discussing Hilbert spaces, you probably should mention who this "Hilbert" guy is. If you are looking at the Intermediate Value Theorem, you should probably mention who is credited with proving it first and when (or if this unknown).
 - Your handout should include at least 1 "big theorem" and either its proof or a "sketch" of its proof (mentioning what is involved in proving it).
 - You should give at least 2 "concrete" examples illustrating your topic/theorem/subject.
 - Your handout should include a discussion of some application or impact of your topic. This can be a scientific, "real-world", or mathematical application or consequence. This includes a kind of "where do we go from here" discussion about what comes next.
- **Presentation/Slides:** You should record a 5 minute presentation (approximately 5 minutes anyway) and create some slides in LaTeXto show during your presentation. You should have a title slide, several content slides, and a final slide with references. Don't just read your handout, but do reference parts of it in your talk.

Point breakdown: Handout 60%, Slides 20%, Presentation 20%.

Handout: Required content (theorem, examples, consequences/application) included/quality/accuracy? 0-30pts, Length/background material? 0-10pts, Sources cited/quality? 0-10pts, Professional/neatness? 0-10pts. Slides: Required content (title, guts, references)? 0-10pts, Professional/neatness? 0-10pts. Presentation: Appropriate length? 0-5pts, Clearly presented/accurate? 0-15pts.

RANDOM TOPIC SUGGESTIONS!!!

Here are some suggested topics. Your don't have to pick from this list, these are just random suggestions.

- From Calculus: You could pick a big theorem like: The Intermediate Value Theorem, The Extreme Value Theorem, or Rolle's/Mean Value Theorem.
- Something more algebraic like: The Fundamental Theorem of Algebra or Factorizations/The Fundamental Theorem of Arithmetic.
- What is a metric space? Or what is a normed space? Or what is a Hilbert space?
- What is uniform continuity? Or what are Cauchy sequences?
- Mersenne primes and perfect numbers.
- Error correcting codes, cryptography, and modular arithmetic.
- What is an Integral Domain? Or what is a Field? Or what is a (linear) algebra?
- Difference equations.
- What is topology? Or what is path connectedness? Or what is compactness?
- What are permutations and symmetric groups?
- Symmetry groups like symmetries of platonic solids.
- What is a quotient object? Quotient groups or quotient vector spaces or quotient topological spaces.
- What is a dual space? What is a tensor?
- Ordinal arithmetic and/or transfinite induction.
- Permutations and determinants

... Don't see anything that strikes your fancy? Come talk to me, maybe I help find a topic for you.

References

[WIKI]	"Vertex Operator Algebra", https://en.wikipedia.org/wiki/Vertex_operator_algebra, Wikipedia, retrieved Nov. 2020.
[C]	Cook, William J. and Noah Hughes, "On the minuscule representations of type B_n ", <i>Involve</i> Vol. 11 (2018), No. 5, 721–733.
[X]	Some guy, <i>This source is in my bibliography but wasn't cited in the handout</i> , I guess I didn't follow directions