

Final Essay for Math Alive

Proposal submission due date: Apr. 20, 2025

Final essay submission due date: 11:59pm, May 11, 2025

General Information: Welcome to the final essay project for Math Alive. The essay should aim to introduce one math topic (the concept and the relevant methods) and its applications to a general audience. The essay is not expected to be technical so a lot of formulas are not required. Instead, you should use your own words to describe the concepts, methods and applications in an accessible way. Your essay should show the readers that the topic is interesting and has important applications. The essay should be 7-8 pages long, with double spacing, 11-pt font size and 1-inch margins.

Instructions:

1. **Academic Integrity:** Collaboration is **NOT** allowed. Please do **NOT** simply copy and paste what you find on the internet, but rather explain the topic in your own words. ChatGPT and similar tools are **NOT** permitted, except of course if your essay is about ChatGPT and you want to include a short section as an example of its capabilities. For more information, please refer to <https://odoc.princeton.edu/learning-curriculum/academic-integrity>.
2. **Topic Selection:** Choose a specific area or topic within your discipline that interests you and where mathematics plays a role. The class covers various real-life applications of math, including statistical paradoxes, modeling infectious diseases, encrypting and decrypting messages, and studying the decision-making process among a group of people using game theory. However, there are many more interesting topics that may be relevant to your own major or interests. Please make sure that your chosen topic is sufficiently narrow and consists of potential applications to allow for in-depth exploration within the scope of the essay. Feel free to reach out to any of us three if you cannot find a good topic.
3. **Preparation:** You are encouraged to conduct thorough research on your chosen topic, utilizing academic journals, textbooks, reputable websites, and other scholarly sources. You could gather relevant information and examples that illustrate the applications of mathematical concepts and take note of any key theories, methodologies, or case studies that you encounter during your research. You are encouraged to submit a **one-page proposal** (optional) before April 20th via Gradescope: <https://www.gradescope.com/courses/967021>. You can include any specific questions on your topic or address any difficulties or confusions in mathematics in your proposal. There is **NO** grade for proposal. The primary purpose of the proposal is to provide a platform for you to outline how your essay will unfold.
4. **Structure:** The essay should include the following components:

- A title;
- The main body;
- Several sources of references. You can use any style of references you prefer.

The main body may consist of:

- Introduction: this section should have less mathematical detail, and you can include (but are not restricted to) the origins of the math idea or its history, background, motivation of the development of the method.
- Description of math concepts: you are welcome to include formulas (not too many) and illustrative figures (not too many). Make sure that the description is clear to the general audience. If your topic involves multiple methods, you can add more text describing different methods and later have some discussions and comparison.
- Description of its applications: this is where the math is connected to your major or interests.
- Discussion about the previous sections: you are very welcome to include your own opinion, which can be either positive or negative.
- Conclusion.

You can decide the order of these components, and you are allowed to combine some of them into one section, but the organization of the paper needs to be clear. You are welcome to include figures, but the the number of lines occupied by those figures should not exceed $1/3$ of the entire essay.

5. **Grading Criteria:** An essay with a good score should:

- be well-organized with a clear structure.
- have a good balance between figures, formulas and text.
- have a clear description/introduction of the math concepts, methods and applications.
- include convincing arguments that math has important applications.

Additionally, you are encouraged to include some discussion with your own opinions, which can be either positive or negative. As an example, facial detection and recognition algorithms are based on math, and you can discuss its positive and negative effects – convenient for unlocking your phone or invasion of privacy?

6. **Writing Guidelines:**

- Use clear and concise language, avoiding jargon or overly technical terms unless necessary.

- Structure your essay logically, with each section flowing smoothly into the next.
- Support your arguments with evidence from your research, citing your sources appropriately.
- Proofread your essay carefully to ensure clarity, coherence, and grammatical correctness.

7. **Submission:** The deadline for submission is May 11th at 11:59pm. **No late submission is allowed.** The submission process remains the same as before, and you can submit your essays via Gradescope: <https://www.gradescope.com/courses/967021>.

Conclusions: The final essay project offers you the opportunity to delve into the intersection of mathematics and your discipline, gaining insights that can enhance your understanding and appreciation of both fields. I encourage you to approach this final project with curiosity and creativity, and I look forward to reading your insightful essays.