

Final Project

MATH 2030

Throughout the class I've tried to show various ways that we can view probability in life. In this project, you will be able to look at an application of probability of your choice! Due to the nature of this project, the project itself should be done individually, but you are allowed to discuss ideas with your friends.

The project consists of you researching an area of the “real world” and showing how that relates to probability. I would *highly* recommend you chose a topic that you find interesting yourself so that you enjoy it more and so that you can use that knowledge to impress! The goal is for you to hopefully learn new things and also talk about an interesting topic that's related to probability. If you can't think of any “real world” examples that are interesting to you or if you want to be more mathematical, you can also take any of the topics we learned in class and go much more in depth. If you do this, you are expected to teach Aram something he didn't know. (So it can't just be something he taught in class ;)) I've given some topic ideas at the bottom of this sheet to hopefully help you get started if you want.

No matter what you decide, your final project should consist of the following:

- A short introduction to your topic
- An explanation of how probability comes up in your topic and/or how it is used to solve a problem in that area.
- At least one worked example using probability in the context of your topic.

There are two parts to the project: an outline which is due earlier and the final project.

1 Project Outline

Due: 12 July 2021

The project outline is here for two reasons: (1) to make sure you stay on track and don't leave it off until the day before and (2) to make sure the topic you're choosing is appropriate for this class level. The outline is super basic and just needs to include:

- Name of your topic (Doesn't need to be the title of your final project)
- A very brief introduction to your topic (imagine a friend asking you what your project is about.)
- A list of concepts from this course that comes up in your project (if it's just 1 thing, that's ok!)
- Links to at least 2 sources on your topic that you consulted for this outline or that you think will be helpful for your final project.

2 Final Project

The due date for the final project is split in case you have a lot of final exams and need to push back the due date. Since you have tooooooons of time to do the final project, there won't be extensions unless something major happened.

- **10 August 2021** - The official deadline =D
- **15 August 2021** - 5 days "late" which means max grade is 85%.
- **19 August 2021** - 9 days "late" which means max grade is 70% - Absolute final day to submit (or else I can't submit your grades in on time).
- If you turn it in after 19 August 2021, then it's an automatic zero except for exceptional cases.

You have two options on how to submit your final project:

- An essay/paper (roughly 3-5 pages), or
- A video (roughly 3-5 minutes)

There is a rubric at the end of this document to help you. You are expected to cite your sources when including references! (I don't care what style you use, just make sure to give credit to the places you learned the information from) If you are submitting a video, please include some indication of where your info came during appropriate times (or submit an outline/script of your video with your citations included). This means that *all* projects should include a bibliography.

3 Project Ideas

Here are some ideas to help you get started. Note that you are *not* limited by this list! If there's a topic outside this list you'd like to go into more detail, feel free to! The more interested you are in a topic, the better for you (as you'll actually want to research it).

- Machine learning (computer science)
- Cryptography (computer security)
- Spam filtering (computer science)
- Packet/data loss (computer science)
- Minecraft speedrun controversy (computer gaming)
- Randomness in games/drops (computer gaming)
- Gambling/Counting cards (economy)
- Sales forecasting (economy)
- Risk evaluation (economy)
- Stock market (economy)
- Weather (meteorology)
- Quantum mechanics (physics)
- Galaxy/planet/etc. counting (astronomy)
- Entropy (chemistry)
- Mutation/Evolution (biology)
- Injury based on movement (kinesiology)

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Understanding of topic discussed (25%)	The project clearly explains the topic and is able to discuss the details. There is clear evidence of accurate research being done. The project presents a level of understanding that has the appropriate depth for the scope of this course.	The project clearly explains the topic, but lacks some important details. There is evidence of research being done, but additional details would improve the project. The project presents a level of understanding that is adequate for the scope of the course.	The project is somewhat vague in its explanation of the topic. Some research has been done, but it is clear that this research was not thorough. The project presents a level of understanding that is somewhat shallow for the scope of the course.	The project is very vague in its explanation of the topic. It is clear that research done was not thorough. The project presents only a surface-level understanding of the topic.
Choice of example (10%)	The example provided is a meaningful demonstration of the topic.	The example provided does not demonstrate the topic completely accurately.	The example provided only vaguely demonstrates the topic.	The example provided is not appropriate for the topic discussed.
Soundness of math in example (10%)	The math being presented is completely correct.	There are small errors in the math being presented.	There are significant errors in the math being presented.	Many aspects of the math presented are incorrect.
Clarity of communication (20%)	Mathematical ideas are presented clearly with accurate language. A reader with introductory probability knowledge (such as someone who has taken MATH 2030) would have no trouble understanding the entire project and learning from it.	Mathematical ideas are, for the most part, presented clearly with accurate language. A reader with introductory probability knowledge would understand most of the project.	Mathematical ideas are somewhat difficult to follow due to inadequate explanation. A reader with introductory probability knowledge would have some difficulty understanding parts of the project.	Mathematical ideas are difficult to follow due to inadequate explanation. A reader with introductory probability knowledge would have a lot of difficulty learning from the project.
Organization and presentation (15%)	The project is easy for the reader/viewer to follow and is presented in a logical and organized manner.	The project is generally easy for the reader/viewer to follow, but could use some additional structure.	There are some difficulties in understanding parts of the project. Some effort has been made in presentation.	The project is difficult to follow due to poor organization. Little effort has been made in presentation.
Extension of class material (20%)	Topic goes beyond the class material and involves learning something new or applies an idea from class in a way that was not covered in class. Very clear that a lot of thought and attention was put into the project.	Topics successfully extends ideas seen in the class material. Clear that a good amount of thought and attention was put into the project.	Topic makes an attempt to extend ideas seen in the class material. Some effort has been made towards the project.	Topic does not extend beyond the class material and does not involve any new ideas or applications. Clear that little thought and attention was put towards the project.