# Syllabus

## MAST

## Spring 2020

# 1 Overview

MAST is for AIME qualifiers who are hoping to improve their AIME score (typically to at least 8 or 9). Even though there is somewhat of an AIME focus, there are many tangential units which aren't really related to the AIME but may still be worth looking at. You decide which of these units are worth looking at and which aren't.

MAST is a primarily self-guided program. I give you a list of units you can do, and you choose the ones that interest you the most. You may work at whatever pace you want (though the suggested pace is at least 1 unit per week.)

## 1.1 Contact Information

I can be emailed at proofprogram@gmail.com. Direct any inquiries about MAST there. If I haven't responded to something in 24 hours, **please remind me.**

## 1.2 Prerequisites

You should have qualified for the AIME this year and should be comfortable qualifying for it next year. Exceptions will be made at my discretion for exceptional cases.

## 1.3 Tuition

Due to the special circumstances, this year's MAST is free. I also need data on the problems, so the problem ratings, your feedback, etc, will be considered as the tuition. (See "Solving a Problem Set" for more details.)

# 2 Meetings

I do not have any meetings scheduled for MAST and don't intend to have regularly scheduled video meetings. If you would like a meeting for any reason, please email me about it so we can find a good time.

If there is interest, I may consider having group problem-solving sessions. These will not be regularly scheduled and will happen based on the people's will/my availability.

# 3 To-do List

Here's a list of what to do.

## 3.1 Diagnostic

This is for before and during the application process.

- **Read "Math Philosophy" on the MAST website.**

This is useful for a number of reasons. It lets you know what you might be getting yourself into. It gives you an idea of my writing style (if you dislike my style, that nearly guarantees the class will not be very useful for you). It also gives general guidelines on how to study (I recommend doing stuff other than MAST as well, if possible).

- **Read the "Application" section on the home page of MAST.**
- **Fill out the Diagnostic.**

It's okay if you don't remember some scores - just fill it out to the best of your ability. This will not hurt you.

- **Attach a PDF of your solutions for the Diagnostic Quiz.** You may take as much time as you would like and use whatever resources you deem helpful. If on the internet, you may search for things like theorems and techniques, but I ask you do not search specifically for the problem. Please do not ask anyone in person about the problems, and direct all clarifications to me.

## 3.2 Picking Units

This is primarily for before you start your first unit, but still applies for the whole year. You should only fill out the Unit Request Form after

- **Visit the Unit Catalogue.**
- **Read recommended units.**

You can completely ignore my suggestions, but it's probably a good idea to read my suggestions nonetheless.

- **Fill out the Unit Request Form.**

Two units will be unlocked for you at a time. You can request units sequentially or make one big request that you think will cover you for a while. You do not have to pick conservatively - it's okay if by the end of this season, there are still units you haven't done.

The order you request your units in matters. This is the order I'll unlock them for you in. If you would like to make a change to this order, let me know either via the Unit Request Form or by email.

- **For any changes you want to make, fill out the Unit Request Form again.**

## 3.3 Solving a Problem Set

These are some guidelines for when you are *doing* a unit.

- **If necessary/helpful, read the material and the walkthroughs.**
- **Alternatively, start with the problems, reading the material only when necessary.**
- **After each problem you solve, rate it from $0$ to $3$ for two criteria: Difficulty and Usefulness.**

Difficulty is how likely you think you can solve something similar in competition relative to other problems. Usefulness is how much you think it will help you solve similar problems in competition. (I like to think of usefulness as the difference between the likelihood you could solve a similar problem in competition before and after you did the problem.)

Alternatively, you may assign a single rating from 0 to 3 based on a combination of Difficulty and Usefulness. This is heuristically based on the answer to the following question: "How much did I need to do this problem, and how much did I get out of doing it?"

You may include a short comment on each problem explaining your opinion if you want to.

I would appreciate, though do not require, you to keep the rating method consistent in each problem set. You do not need to keep the rating method consistent between different problem sets. (This flexibility is to ensure I get enough good data by not demanding perfect data.) Please make sure to rate the problem immediately after you solve it.

- **Do (roughly) $\frac{2}{3}$ of the problems before you turn a unit in.**

Use your judgement here for "close call" cases - if you've done 2/3 of the problems but you picked all the easier ones, try a hard one! Conversely, if you've done a lot of hard problems but are a problem or two short, you can call it a day. (In practice the latter will not happen very often, since finishing an easier problem to get to the $\frac{2}{3}$ benchmark is pretty easy.)

I plan on eventually making a point system to quantify how much a problem is "worth." To do this, I will rely partially on my own judgement, but primarily on the ratings/comments you give me for the problems. (Which is why it's really important you treat them seriously and do them!)

## 3.4 Submitting a Problem Set

This is the procedure for after you have *finished* the unit.

- **Email me a PDF of your submission.**

I suggest using LaTeX. Overleaf is a good place to start.

- **Include any general questions/comments/feedback in your email.**

This is really valuable to me. Don't be shy to say something! Problem suggestions for a unit are also really cool and make me very happy. **If you don't know where to leave a comment, the rule of thumb is to leave it where you think I'll see it.** But don't worry too much about the proper "place" to leave a comment.