1 Essays

The essays should be submitted in the lectures on the following dates. [These may be subject to change.] Please choose one essay from the choices given for each date:

- Wednesday 1st February.
- Wednesday 15th February.
- Wednesday 29th February.
- Wednesday 14th March.

The essays should cover the topics to a reasonable depth. I would envision about 5 pages of double-spaced 12pt text, but write however much you feel is necessary and sufficient to cover the topic to a similar depth.

The following are plausible essay titles, many of which should be closely related to the topics covered in the lectures. Some of the later titles may be changed, depending on what material is actually covered.

It should be possible to do most of the essays based on the sources studied and the discussions in class. You may choose to write an essay using any of the titles, even if the relevant topics were not covered sufficiently in the lectures, but in that case you will need to do the relevant research/reading on your own — contact me if you plan to do this — I may be able to identify suitable materials for you to read.

1.1 Essays for 1st February:

Is Mathematics an Art Form?

Discuss whether it is reasonable to view mathematics as an art form, or whether it is reasonable to view mathematics as not being an art form, and related issues, such as:

why is mathematics treated differently from other art forms?
how is mathematics like other artforms; how is it different?
should mathematics education focus on the artistic or the practical side?

The Beauty of Mathematics and the Mathematics of Beauty

Mathematics has beauty. Describe the characteristics of beautiful mathematics. Conversely, beauty in a number of other artforms is related to mathematical patterns — discuss the sort of mathematical patterns that contribute to beauty in other artforms. You may also wish to discuss artwork inspired by mathematical ideas or created mathematically — e.g. fractals, Escher.

1.2 Essays for 15th February:

What is the Role of Mathematics?

Discuss the value of mathematics. This has two aspects — the societal aspect, i.e. the benefit to society derived from mathematical developments; and the individual aspect, i.e. the benefits to an individual in society of learning and understanding mathematics. You may restrict attention to modern society, or consider the issue for a range of historical societies.

What would life be like without mathematics?

Discuss what the differences would be if we lived in a society that had never developed much of the mathematics that we are familiar with. Be careful not to underestimate what can be done without mathematics, just by trial and error.

1.3 Essays for 29th February:

What is Mathematics?

Discuss the many different aspects of mathematics, and how they relate to one another, and how mathematics should be perceived. You may also discuss how views on this have changed thoughout history.

A Vision for Mathematics Education

What could/should be done to improve mathematics education in Canada? Feel free to discuss potential changes to curriculum, teaching methods, society, teacher recruitment and training, or any other aspect that could have an influence. Explain the benefits of your proposals, and the drawbacks, and if possible, why the benefits outweigh the drawbacks.

1.4 Essays for 14th March:

An Overview of Modern Mathematics

Give an overview of the different fields of study that comprise modern mathematics, with some description of each field, its context, the main results/questions in the field, and its relation to other fields.

The History of ...

Describe the history of one particular field of mathematics: the original motivation or pioneering work; the development of the field; how it contributes to other fields; possible future directions for the field.

2 Project

The project should explain or discuss some aspect of mathematics and its relation to human existence. Feel free to ask me about the suitability of potential project topics. Typically, a project should be presented in class as a 15-minute presentation, followed by questions, and a handout/essay should be prepared covering the same material. If you feel that your project could be better presented in some other way, please discuss this with me.

It is expected that a project will involve substantial research into the chosen topic beyond the material covered in lectures, so, while it is possible to do a project on the same topic as an essay, the project would need to study the topic in far greater detail and include ideas from a number of sources not studied in the lectures.

As mentioned above, you are free to choose any mathematically related topic for your project, but the following are suggestions for plausible projects:

Mathematics and Art/Music/...

Choose some particular artform, and describe how mathematical patterns influence our aesthetic taste in this artform, how mathematical ideas influence this artform, and how mathematics has played a role in the development of the artform, or how mathematics improves our ability to create this artform.

The Mathematics of ...

Choose some real world application of mathematics, and describe the mathematics behind it, possibly including the history of the relevant mathematics, or its place within mathematics as a whole, how it solves real-world problems, how it came to be applied to this real-world application, or how it has influenced mathematics.

...

Choose a mathematical area or topic and explain it — the motivation, the history, its interaction with other mathematical topics/areas, possible future directions for the topic, etc.

The Life and Work of ...

Choose a great mathematician or some other famous person who was strongly influenced by mathematics, and describe his life and works, and the influence of mathematics on them.

Mathematics in ...

Choose a civilization, and describe mathematics in that civilization — the state of mathematics, views of mathematics, the role of mathematics, ...

The Use of Useless Mathematics

Talk about examples of applications of mathematics which until the applications arose, was considered "useless", or without practical applications.