DAILY TOPICS – MATH 4030 – FALL 2022

FOUNDATIONS OF ALGEBRA

Discussion Template:
- Statement (with any needed definitions)
- History (if applicable)
- Context (in the curriculum)
- Proofs (as necessary)
- Examples
- Applications
- Problems

Discussion Topics

Solving Equations.
- Balancing equations and solving linear equations (one variable). 8/24
- Factoring quadratic polynomials and some higher degree polynomials 8/29
- The quadratic formula and rational roots of rational polynomials 8/31
- Newton's method for approximating real roots 9/7
- Solving Linear equations in two and three variables 9/12
- Inverting square matrices (and applications) 9/14

Algebraic Structures.
- Place value, decimals and scientific notation 9/19
- Other bases, especially base two 9/21
- Infinite decimal expansions of rational numbers 9/26
- Infinite series (especially geometric series) 9/28
- Functions and their power series expansions 10/3
- Algebraic relations in the real world 10/5
- The Pythagorean theorem and other trig identities 10/17
- Algebraic relations among exponentials and logarithms 10/19
- The binomial theorem, Pascal's triangle and Fermat's little theorem 10/24

Symmetry.
- Vectors and products (dot and cross). 10/26
- How to multiply complex numbers in $re^{i\theta}$ form. Extracting nth roots. 10/31. (Boo!)
- Rotations and reflections of the plane in matrix form. 11/2
- Characteristic polynomials and eigenvalues of square matrices. 11/7
- Permutation groups and permutation matrices. 11/9
- Groups of symmetries of regular polygons. 11/14
- The Platonic solids and their symmetries. 11/16

Presentations.