Math 065 **Bridge to Higher Mathematics** **Fall 2025**

Course Information

TIME: (Mo, We, Fr 10:30–11:45)
LOCATION: see SIS
INSTRUCTOR: George McNinch
PREREQUISITES: None
QUESTIONS: please e-mail `george.mcninch@tufts.edu`
OFFICE: 559 JCC

COURSE DESCRIPTION:

This course serves a preparation for investigation of higher-level mathematics. It hopes to assist you with your transition from Calculus-level courses to more advanced classes that require proofs and more abstract reasoning.

Here are some of the topics we will consider:

1. careful discussion of *sets*, *functions*, *relations* and their properties
2. *combinatorics* (including counting arguments using the *pigeonhole principle* and using *binomial coefficients*)
3. the theory of *graphs* defined abstractly by *vertices* and *edges*
4. properties of *modular arithmetic*
5. precise definitions for *convergence* of *sequences* and *series* of real numbers.
6. the *cardinality* of a set

Throughout our discussion of these topics, we will focus on careful mathematical reasoning and providing proofs for our assertions.

In McNinch's section, the course will spend *some* time introducing and having you learn to use a dialect of the *proof assistant* LEAN in order to write and *verify* proofs with a computer. Writing a proof in Lean "ensures that it is completely correct: no substitutions of an inequality under a minus sign, no divisions by zero, no terms dropped in the algebra...." You can read a nice discussion of other advantages of Lean here.

WHY WOULD YOU WANT TO TAKE THIS COURSE?

This course should help prepare you to take proof-based advanced mathematics courses. More generally, it should develop your logical skills and hence should be useful in almost any academic discipline.