Final Exam Topics **December 2023**
Discrete Mathematics II **Prof. Nollet**

We covered parts of chapters 6,8,10,11,13 and 14 in our course. See previous review sheets for more details on the topics below.

6 §1 − 5, 7, 9. Binary relations and their representations: lists; arrows; matrix, properties of relations: (anti-)reflexive; (anti-)symmetric; transitive, digraph picture for relations on a set A, digraph language: vertices, directed edges, self-loops, in/out-degrees; walks; trails; circuit; paths; cycles, composition of relations, graph powers and transitive closure, partially ordered sets and Hasse diagrams (maximal/minimal elements, comparability), equivalence relations and equivalence classes.

8 §2, 15 − 16. Recurrence relations, method to solve linear homogeneous equations and linear non-homogeneous equations, homogeneous and particular solutions. Know FORMS of solutions for various cases.

10 §1 − 12. Sum and product rules, bijection and $k-1$ rules, permutations $P(n,k) = n!/(n-k)!$ and combinations $C(n,k) = n!/k!(n-k)!$ and usage, counting complements, inclusion-exclusion rule. Trickier ideas: permutation with repetition and multisets.

11 §3. Pigeonhole principle arguments, understanding the $\lceil \frac{p}{h} \rceil$ formula.

13 §1 − 6, 8. Graph language and representation, isomorphisms and properties preserved, degree sequence, total degree, connected components, vertex connectivity $\kappa(G)$, edge connectivity $\lambda(G)$, $\kappa(G), \lambda(G) \leq \delta(G)$, Euler circuits and trails, planar graphs (Euler's identity, regions and degrees).

Suggestions: Look at homework, quizzes, class examples, book problems not assigned, since I will look at these when I write the exam. See if you can still do the old exams, this can help assess what you need to review. There will likely be some similar problems on the final. The final is cumulative and may combine ideas from different sections.