Exam 2 **October 2021**
Discrete Mathematics **Prof. Nollet**

The second exam will cover sections 10 through 12, 17, 19 and 20 in the book. The book has a self test at the end of each chapter.

3-9 New material builds on old, so you are still responsible for definitions, if-then statements, direct proofs, lists and the multiplication principle (I do not plan to ask about Boolean algebra), definition of factorial and product notation.

10 Sets, containment ($A \subseteq B$), elements ($a \in A$), equality of sets, the power set $P(A) = 2^A$ and its cardinality. Don't confuse a and $\{a\}$!

11 Quantifiers $\forall$ and $\exists$, negating statements with quantifiers, determining truth of statements with quantifiers. Order of quantifiers matters!

12 Set operations such as union $A \cup B$, intersection $A \cap B$, set difference $A-B$, symmetric difference $A\Delta B$, Cartesian product $A \times B$, cardinality of $A \cup B$ and addition principle, Venn diagrams

17 Number of size k subsets from size n set is $C(n,k) = \binom{n}{k} = \dfrac{n!}{k!(n-k)!}$ valid for $0 \leq k \leq n$.

19 Inclusion-exclusion formula for finding cardinality of unions of sets

20 Proof by contrapositive and proof by contradiction.

Suggestions: Look at homework, quizzes, class examples, book problems not assigned and the chapter tests. I will look at these when I write the exam.

Note: although I put Section 20 on this review sheet, I will not ask any direct questions on Section 20 because you haven't done the homework yet. I only put it here because (as I showed in class), sometimes contradiction proofs are useful for proofs involving sets, especially showing that a set is empty.