

Exam 3 Review
Discrete Mathematics

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Exam 3 covers the topics we studied in sections 20, 22, 24, 25, 35 and 36.

- 3-19 New material builds on old, so you are still responsible for definitions (\mathbb{N} , \mathbb{Z} , \mathbb{Q} , even, odd, prime composite), if-then statements, direct proofs, lists, the multiplication principle, inclusion-exclusion, counting.
- 20 To prove $A \Rightarrow B$, know how to use contrapositive ($\neg B \Rightarrow \neg A$) and proof by contradiction ($A \wedge \neg B \Rightarrow \text{contradiction}$).
- 22 Proof by induction or strong induction. Be sure you know structure of these proofs. Fibonacci numbers or something related is a possibility.
- 24 Functions, domain, codomain, image, graph, 1-1 functions, onto functions, one to one correspondence. Make sure you know DEFINITIONS.
- 25 Pigeon hole principle (if p pigeons placed in h holes and $p > h$, then some hole contains at least two pigeons).
- 35 The division algorithm: for $a, b \in \mathbb{Z}$ with $b > 0$, there are unique q and $0 \leq r < b$ with $a = bq + r$, notated $q = a \text{ div } b$ and $r = a \text{ mod } b$. Connection to $a \equiv b \pmod{m}$.
- 36 Definition and computation of $\text{gcd}(a, b)$. You should know Euclidean algorithm to compute $\text{gcd}(a, b)$ and how to use it to find $m, n \in \mathbb{Z}$ with $\text{gcd}(a, b) = ma + nb$. Definition of relatively prime.

Suggestions: Look over homework, quizzes, class examples, book problems not assigned and chapter tests.