Midterm 3 Review

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Things to know:

1. relations
2. functions $\rightarrow$ for $(a_1, b), (a_2, b) \in R \implies a_1 = a_2$. In other words, you must prove uniqueness
3. Equivalence relations
4. Equivalence classes
5. Partitions
6. $\mathbb{Z}_n$
7. well-definition
8. $|A| = |B|$, $|A| < |B|$
9. Countable and uncountable sets
10. $\aleph_0$, c

Theorems to know

1. Equivalence classes and Partitions
2. Addition and multiplication on $\mathbb{Z}_n$, that is the ring of all equivalence classes in $\mathbb{Z}/\sim_n$ where $\sim_n \iff a \equiv b \mod n$
3. Subsets of Countable sets are Countable
4. unions of countabley countable sets are Countable
5. Cartesian products of countable sets are Countable
6. $\mathbb{R}, (a, b), P(\mathbb{N})$ are all uncountable
7. Any set with an uncountable subset is uncountable
8. $|A| < |P(A)|$
9. $|A| \leq |B| \leq |A| \implies |A| = |B|$