MAT 200 OUTLINE, PART 4

I'm preparing a lecture outline for the benefit of those who are unable to make it to class due to illness or other reasons. See the course textbook for additional details about most of these items. If a theorem is listed as $\boxed{\textbf{Theorem.}}$, this means that you should be familiar with the proof.

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- A partition of a set
- A relation on a set (a property that may or may not be satisfied by each ordered pair of elements in the set)
- Reflexive, symmetric, transitive properties of relations; equivalence relations
- Examples of relations ($\leq$, $<$, $=$, congruence, etc.), determining which properties they satisfy
- Prime number
- Sieve of Eratosthenes
- The fundamental theorem of arithmetic: the existence and uniqueness of a prime factorization for every nonzero integer
- Use the prime number theorem to find set of divisors of an integer

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- $\boxed{\textbf{Theorem.}}$ Fermat's little theorem. If p is a prime number and a is not a multiple of p, the $a^{p-1} \equiv 1 \mod p$.
- Wilson's theorem. If p is a prime, then $(p-1)! \equiv -1 \mod p$.
- Prime number theorem (this and the next not to be tested): For each $n \in \mathbb{N}$, let $\pi(n)$ be the number of primes less than or equal to n. Then $\pi(n)/(n/\ln(n)) \to 1$ as $n \to \infty$.
- The Riemann hypothesis: generally considered the most prestigious unsolved problem in mathematics