

MATH 300
Spring 2011

You may use the following results without proof on the final exam. You should prove any other results you wish to use on the final.

1. Let a , b and c be integers.
 - (a) $a(a + 1)$ is even.
 - (b) $a + b$ is even if and only if a and b have the same parity.
 - (c) a is even if and only if a^2 is even.
 - (d) If $a|b$ and $b|c$, then $a|c$.
 - (e) If $a|b$ and $a|c$, then $a|(b + c)$.
2. Let x , y , and z be real numbers.
 - (a) $|x|^2 = x^2$.
 - (b) $|xy| = |x||y|$
 - (c) $|x - y| = |y - x|$
 - (d) $|x + y| \leq |x| + |y|$ (The Triangle Inequality)
3. Let A , B , and C be sets.
 - (a) $A \subseteq A \cup B$ and $A \cap B \subseteq A$
 - (b) $A \cap \emptyset = \emptyset$ and $A \cup \emptyset = A$
 - (c) $A \cap A = A \cup A = A$
 - (d) $A \cup B = B \cup A$ and $A \cap B = B \cap A$
 - (e) If A has an infinite subset, then A is infinite.
 - (f) If A has an uncountable subset, then A is uncountable.
 - (g) If A and B are countable, then $A \cup B$ is countable.
4. Let A , B , and C be sets and suppose $f : A \rightarrow B$ and $g : B \rightarrow C$.
 - (a) $g \circ f$ is a function from A to C .
 - (b) If f and g are one-to-one, then $g \circ f$ is one-to-one.
 - (c) If f and g are onto, then $g \circ f$ is onto.
 - (d) If f is a bijection, then f^{-1} is a bijection from B onto A .
5. Congruence mod m is an equivalence relation on \mathbb{Z} .
6. Equivalence of sets is an equivalence relation on the set of sets.
7. The Principle of Mathematical Induction.
8. \mathbb{N} , \mathbb{Z} , $\mathbb{N} \times \mathbb{N}$, and \mathbb{Q} are denumerable (and therefore countable).
9. $(0, 1)$ and \mathbb{R} are uncountable.