

Math 302 Midterm Study Guide

Definitions:

- (1) binary number
- (2) ternary number
- (3) rational number
- (4) real number
- (5) countable set
- (6) two sets have the same size
- (7) Cantor Set
- (8) geometric series
- (9) and, or, not, implies, if and only if
- (10) converse of an if-then statement
- (11) contra-positive of an if-then statement
- (12) distance axioms
- (13) ball $B_r(a)$ of radius r about point a
- (14) interior, exterior, boundary point
- (15) taxi-cab distance
- (16) standard distance for the real number line, $x - y$ plane

Theorems:

- (1) the set of positive rationals is countable
- (2) the set of real numbers is not countable
- (3) there are as many elements in the Cantor Set as there are positive real numbers in the interval $[0,1]$
- (4) the square root of 2 is not rational
- (5) the length of the Cantor Set is 0

Things you should be able to do:

- (1) Sum the integers from 1 to n
- (2) write a fraction as a repeating decimal, binary, or ternary number
- (3) write a repeating decimal, binary, or ternary number as a fraction
- (4) evaluate the sum of a geometric series
- (5) find the room number in Hotel ∞ of a passenger from their bus and seat number
- (6) determine whether a real number between 0 and 1 is in the Cantor Set
- (7) determine whether a sentence (with “and, or, not, implies”) is true or false
- (8) negate a statement
- (9) determine the distance between two points for various distance functions