

MATH250, SPRING 2020
MIDTERM 1 REVIEW

Midterm 1 covers Chapter 1 and Section 2.1, 2.2. Some specific topics are

(1) Logic:

- (1) Sec 1.1: understand statements, open sentences, quantifiers; be able to identify quantifiers in a given sentence.
- (2) Sec 1.1, 1.2: understand operations on statements (with quantifiers) including negation, conjunction, disjunction; be able to prove logically equivalent of statements using truth table and logic formula (posted on course webpage).
- (3) Sec 1.3, 1.4: understand implication (with quantifier); be able to find the negation, converse, contrapositive of an implication; understand sufficient and necessary condition, biconditional.

(2) Proof methods:

- (1) be able to prove $\forall x, P(x) \implies Q(x)$ using the three methods
 - (a) Direct proof
 - (b) Proof by contrapositive
 - (c) Proof by contradiction;understand the logic behind each method, be able to identify hypothesis and conclusions; know how to disprove (counter-example).
- (2) Sec 5.3, 5.4: know the basics of divisibility, prime (that we discussed in lectures); know how to use division algorithm and unique factorization theorem.

(3) Set theory:

- (1) Sec 2.1: understand the definition of sets, subsets; be able to show $A \subset B$ and $A = B$; understand empty set, intervals and some common notions of sets.
- (2) Sec 2.1, 2.2: understand operations on sets including complements, union, intersection; be able to draw Venn diagram; understand and be able to use properties of sets such as distributivity, DeMorgan's law, etc.

Some suggestions:

- Make sure you understand all the topics listed above.
- Make sure you can do all the homework problems without external helps. There are many exercises similar to the hw problems in the textbook. Please practice and find help if there is any trouble.