

## 21-131 Assignment 2: due Tuesday September 9

**2.1.** If  $A$  and  $B$  are sets of real numbers with nonempty intersection, show that

$$\sup(A \cap B) \leq \min\{\sup A, \sup B\}.$$

I.e., if  $a = \sup A$ ,  $b = \sup B$  and  $c = \sup(A \cap B)$ , prove  $c \leq \min\{a, b\}$ . Devise an example of sets  $A$  and  $B$  for which  $c < \min\{a, b\}$ .

**2.2.** (Velleman p. 106 no. 4) Suppose  $A \setminus B$  is disjoint from  $C$  and  $x \in A$ . Prove that if  $x \in C$  then  $x \in B$ . (Suggestion: Prove the contrapositive—see example 3.1.3 on page 91.)

**2.3.** (Tougher...) Suppose that  $a$  and  $b$  are positive integers. Show that

$$\text{if } \frac{a}{b} < \sqrt{2} \quad \text{then } \sqrt{2} < \frac{a+2b}{b+a}.$$

Is the converse also true?

From Apostol, write solutions to the following problems:

**2.4.** page 21 #5

**2.5.** page 21 #9

**2.6.** page 21 #10

**2.7.** page 28 #3

**2.8.** page 28 #4

**2.9.** page 28 #9