

Mathematics 170A – HW1 – Due Tuesday, January 17, 2012.

Problems 1, 2, 5, 6, 7, 8, 9, 10 on pages 53–54.

A. Show that if A and B_n are events, then

$$A \cap \left(\bigcup_{n=1}^{\infty} B_n \right) = \bigcup_{n=1}^{\infty} (A \cap B_n)$$

in two different ways:

- (a) Directly, without using De Morgan's laws.
- (b) Using the result of Problem 3 on page 53.

B. Suppose A_n are events, and let

$$B = \bigcap_{n=1}^{\infty} \left[\bigcup_{k=n}^{\infty} A_k \right].$$

(a) Show that

$$B = \{x \in \Omega : x \text{ is an element of infinitely many } A'_n \text{ s}\}.$$

(b) Use the result of Problem 13 on page 56 to show that if $P(A_n) = 2^{-n}$ for each n , then $P(B) = 0$.