**Homework 1**
**36-325/725**
**due Friday Aug 31**

(1) Chapter 1.4 Problem # 7. (Note that when you do this question, you are proving the assertion in the lecture notes about how to interpret "limsup $A_n$" and "liminf $A_n$".

(2) Chapter 1.4 Problem # 4

(3) Let $S = \{0, 1, \ldots, \}$. Prove that there does not exist a uniform distribution on $S$.

(4) Let $A_1, A_2, \ldots$ be events. Show that

$$P\left(\cup_{n=1}^{\infty} A_n\right) \leq \sum_{n=1}^{\infty} P\left(A_n\right).$$

Hint: Define $B_n = A_n - \cup_{i=1}^{n-1} A_i$. Then show that the $B_n$ are disjoint and that $\cup_{n=1}^{\infty} A_n = \cup_{n=1}^{\infty} B_n$.

(5) Suppose that $P(A_i) = 1$ for each $i$. Prove that

$$P\left(\cap_{i=1}^{\infty} A_i\right) = 1.$$

(Hint, use (2) and (4)

(6) Download R. Download the R tutorial from my web site. Follow the tutorial. Do not hand this question in.