T-61.5060 EXERCISE 3/2005

In T3 on 12 October 2005 at 12 o'clock.

1. Consider the problem of finding what fraction of rows in a 0-1 database satisfy a given Boolean formula. For example, denote by $g(A = 1 \vee B = 1)$ the fraction of rows that have $A = 1$ or $B = 1$. Express $g(A = 1 \vee B = 1 \vee C = 1)$ in terms of frequencies of sets (i.e., by using $f(X)$ for suitable sets X).

2. Generate random event sequence data containing 10 different types of events and altogether 10,000 events. Compute for all pairs of events what is the probability that they occur together in a window of size W, for suitable widths W.

3. Consider an event sequence containing events of types A and B, distributed uniformly at random over the time interval. Let n_A and n_B be the expected number of events of types A and B occurring in a unit interval, respectively. Compute the probability that a window of width W contains both A and B.