CMSC 858S, Spring 2007: Reading Homework 2, due at the start of class on May 4th

Notes. Please work on this with your group-mate(s); just submit *one* writeup per group. Consulting other sources (including the Web) is not allowed. Write your solutions neatly; if you are able to make partial progress by making some additional assumptions, then state these assumptions clearly and submit your partial solution.

0. Read from the beginning up to (and including) the statement and proof of Theorem 3.11 from the paper "The deletion method for upper tail estimates" by Janson and Ruciński, available from *http://www.staff.amu.edu.pl/∼rucinski/papers/72.pdf*. I will assume for the final exam that you have done this reading.

1. Answer the following two questions about Theorem 2.1 in the paper.

(a) In the upper bound on $\Pr(X \geq \mu + t)$ from the statement of the theorem, the first term in the r.h.s. is $(1 + t/(2\mu))^{-r}$. Improve this (slightly) in the case where r is not an integer. **(5 points)**

(b) The dependency relation $\sim$ is assumed in the theorem to satisfy the following condition: "for all α, Y_α is independent of $\{Y_\beta : \beta \not\sim \alpha\}$". A careful reading of the proof of the theorem shows that independence is not necessarily needed here, and that a certain form of correlation will suffice. State precisely (in mathematical terms, not informally) what this correlation condition is. **(5 points)**