Special Topics Course Announcement, Spring, 2006
Statistics 593C (3cr): Non-standard asymptotics and particle systems
Instructor: Piet Groeneboom
Time: 10:00 - 11:20 Tuesdays and Thursdays
Place: Padelford C-301

Description of the topic of the course:

Many nonparametric estimators which arise as solutions of optimization problems (maximum likelihood, least squares, etc.) have non-normal limit distributions, and converge at rates slower than $n^{-1/2}$. This type of limit behavior is commonly called "non-standard asymptotics", and the local limit often has a characterization in terms a stationary point process. The latter was shown, for example, in [3] for the Grenander estimator of a decreasing density. Results of this type have counterparts in the theory of interacting particle systems on the integers, such as TASEP (totally asymmetric simple exclusion processes) and in the theory of interacting particle systems on the real line, such as Hammersley's process. The connection between these seemingly unrelated fields is discussed in [2] for Hammersley's process, with a follow-up for TASEP in [1]. It is my intention to discuss recent results on these matters and to explore the rather fascinating connection between the fields further during the course. I will also discuss the (many) open problems.

[1] Balasz, M., Cator, E.A. and Seppalainen, T. (2006). Fluctuation bounds for the corner growth model of the exclusion process. Manuscript in preparation.

[2] Cator, E.A. and Groeneboom, P. (2005). Second class particles and cube root asymptotics for Hammersley's process. To appear in the Annals of Probability.

[3] Groeneboom, P. (1989). Brownian motion with a parabolic drift and Airy functions. Probability theory and related fields, 81, 79-109.

A selection of further papers, relevant for the topic of the course:

[4] Aldous, D. and Diaconis, P. (1995). Hammersley's interacting particle process and longest increasing subsequences. Probab. Th. Relat. Fields, 103, 199-213.

[5] Baik, J, Deift, P.A. and Johansson, P. (1999). On the distribution of the length of the longest increasing subsequences of random permutations. J. Amer. Math. Soc. 12, 1119-1178.

[6] Cator, E.A. and Groeneboom, P. (2005). Hammersley's process with sources and sinks. Annals of Probability, 33, 879-903.

[7] Groeneboom, P. (1983). The concave majorant of Brownian motion, Annals of Probability, 11, 1016-1027.

[8] Groeneboom, P. (1988). Limit theorems for convex hulls. Probability theory and related fields, 79, 327-368.

[9] Groeneboom, P., G. Jongbloed and J.A. Wellner (1999). Integrated Brownian motion conditioned to be positive. Annals of Probability, vol. 27, 1283-1303.

[10] Groeneboom, P., G. Jongbloed and J.A. Wellner (2001). A canonical process for estimation of convex functions: the"invelope" of integrated Brownian motion $+t^4$. Annals of Statistics, 29, 1620-1652.

[11] Groeneboom, P., Maathuis, M.H. and J.A. Wellner (2006). Current status data with competing risks: characterization, consistency and rate of convergence of the MLE. Manuscript in preparation.

[12] Hammersley, J.M. (1972). A few seedlings of research. Proc. 6th Berkeley Symp. Math. Statist. and Probability, 1, 345-394.