

# IEOR 8100: Topics in OR: Asymptotic Methods in Queueing Theory

Fall 2009, Professor Whitt

Class Lecture Notes: Wednesday, September 16.

## more on Donsker's theorem

### Topics Covered

1. heavy-traffic limits for stable queues: a sequence of queueing models; §5.4 of [W]
2. CLT for a triangular array or a double sequence of random variables; see Chapter 7 of Chung, *A Course in Probability Theory*.
3. weaker conditions; Chapter 4 of [W]
4. alternative scaling; §5.5 of [W]
5. The probability law of a stochastic process; the prob. law is determined by the finite-dimensional distributions, but convergence of probability laws requires more. See the Kolmogorov extension theorem; see p. 60 of Chung.
6. characterizing a probability law on the function spaces  $C$  and  $D$ , versus characterizing convergence. Convergence in distribution requires convergence of f.d.d.'s plus tightness.
7. compactness and tightness, Prohorov's theorem; see §11.6 of [W]; see §5 and §7 of [B]
8. the function spaces  $C$  and  $D$

For the mathematical framework, see Chapters 3 and 11 in [W].