HW 6 Math/Stat 563 Due Friday Oct. 31, 2019

1. (Durrett 3.3.12 modified) Let c be a constant. Show that $X_n \to c$ in probability if and only if $X_n \Rightarrow c$.

2. Let $\{X_n\}$ be iid and uniformly distributed on the finite set $\{1, 2, ..., m\}$. In repeated sampling, let ν_m be the time of the first coincidence, that is the time when an outcome is first repeated:

$$\nu_m = \inf \{ n \ge 2 : X_n \in \{X_1, \dots, X_{n-1}\} \}.$$

Show the weak convergence

$$\frac{\nu_m}{\sqrt{m}} \Rightarrow \nu$$

and compute $P(\nu > x)$ for x > 0.

3. (Durrett 3.3.1) Show that if φ is a ch. f., then $\operatorname{Re}(\varphi)$ and $|\varphi|^2$ are also ch. f.'s.