Math 6710, Fall 2016
Homework 12

1. Durrett Exercise 3.4.9.

2. Durrett Exercise 3.4.12.

3. Suppose the hypotheses of the Poisson convergence theorem (Theorem 3.6.1 in Durrett or Theorem 14.1 in the notes) are satisfied. Show that the centered random variables $\overline{X}_{n,m} = X_{n,m} - E[X_{n,m}]$ satisfy condition (1) of the Lindeberg-Feller Central Limit Theorem. Argue that if condition (2) were also true, then $S_n = X_{n,1} + \cdots + X_{n,n}$ would converge weakly to a $N(\lambda, \lambda)$ distribution, when we know it actually converges to a Poisson(λ) distribution. Verify by direct computation that in fact condition (2) does not hold. As Durrett writes: "Note that in the spirit of the Lindeberg-Feller theorem, no single term contributes very much to the sum. In contrast to that theorem, the contributions, when positive, are not small."

4. Durrett Exercise 3.6.5.

5. Durrett Exercise 3.6.12.