**Theory of probability and random graphs – HW4**

**Q1. Solution:**

By Markov Inequality:

the rest will be easy

**Q3. Solution:**

* Prove Poisson

Thus, . Similarly,

* Prove Independent

Thus, and are independent.

* **Q4. Solution:**
  + Question 1. – While is workable

The probability that a particular ball lands in a bin by itself:

By linearity of expectation, the expected number of balls that get served is:

Thus, the expected number of balls at the start of the next round is

* Question 1. – While is not workable

The expected number of balls at the start of the next round is

* Question 2.

When , we can get . Then using the result above,

From the recursive relation , ……

We can get: ,

, denotes constant

Thus, all the balls would be served in rounds.