Pop Quiz 3

CSCI 4030 / CSCI 6220: Randomized Algorithms

Fall 2026

Rensselaer Polytechnic Institute

[10 points] Problem 1 (Maximum load in balls and bins).

Suppose that n^2 balls are thrown independently and uniformly at random into n bins. Let $L_{\max}$ denote the maximum number of balls in any bin.

Show that

$$L_{\max} = n + O\left(\sqrt{n \ln n}\right)$$

with high probability, by using a union bound and a multiplicative Chernoff bound.