

Problem ♣–3

Due in DSC 235 by 12 noon, Friday, September 14, 2018

Problem: Let S_n be the number of successes in n independent Bernoulli trials with probability of success p and let $\delta > 0$. Show that

$$P\left(\left|\frac{S_n}{n} - p\right| \geq \delta\right) \leq 2e^{-n\delta^2/4}.$$

RULES:

- The competition is open to all *undergraduate* UNO students and it is supervised by *Upper Curriculum Committee* of the Mathematics Department.
- Submit your solutions to Andrzej Rosłanowski in DSC 235 or to his mailbox.
- Every nontrivial step/claim in your solution must be justified. You may cite/quote a result from your textbook, past problems of the week and other widely available sources. In each case you have to give full reference.
- There are no partial credits, so rather err on the side of caution and provide more explanations than less. If you are not sure that your sources/references are appropriate, please include the complete relevant proofs from there.
- Your answers should be written clearly and legibly. We reserve the right to refuse grading your work if it is difficult to read it.
- The winners of Fall 2018 edition of POW will be determined at the end of the semester based on the number of correct solutions submitted.
- Problems will be posted by Friday 5pm and the solutions are due by the following Friday 12 noon.

PRIZES:

- The semester prizes will be determined by the Upper Curriculum Committee in a couple of weeks.
- Everybody scoring in the POW Competition qualifies for the grand finale:
 $\frac{\pi}{2}$ *Mathematical Competition*.