

Problem \diamond -12

Due in DSC 222 by 12 noon, **Friday, April 12, 2019**

Problem: Let X be the set $\{1, 2, \dots, 20\}$ and let P be the set of all 9-element subsets of X . Show that for every function $f : P \rightarrow X$ we can find a 10-element subset Y of X , such that $f(Y \setminus \{k\}) \neq k$ for any $k \in Y$.

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 222 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 Spring 2019 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:

- Winners will receive books published by the American Mathematical Society. The titles actually awarded will be selected in cooperation with the awardees.
- Everybody scoring in the POW Competition qualifies for the grand finale:

$\frac{\pi}{2}$ *Mathematical Competition*.

The grand finale will take place on Friday, April 19, 2019 with grand prizes of \$300, \$400, and \$500.