

2018-19 Puzzle Contests

Contest #3



Parents and Grandparents Puzzles

1. The North Pole Mathematical Society has announced the 2019 prize for finding a polynomial $p(x)$ with integer coefficients with the following properties:
 - a) For three different integers c_1, c_2, c_3 $p(c_1) = p(c_2) = p(c_3) = 1$
 - b) The equation $p(x) = 0$ has at least one integer root

The winner of the prize will be presented the grand prize by Santa himself at the annual North Pole Mathematical Society (NPMS) Dinner. The nature of the prize will be revealed upon presentation of the aforementioned polynomial to the representatives of the NPMS at MWSM. Please submit your solutions to qualify. **(40 pts)**



Solutions deadline is January 6
Please submit your solutions to anna.charny@metrowestschool.com
or bring them to the office

2. When the clock strikes midnight on the New Year's Eve 2019, a 2019-digit number magically appears on the board of the Lecture Hall of the North Pole Mathematical Society. It is known that any two-digit number that is made of any two adjacent digits of this number (taken in the order they appear in the original number) is divisible either by 17 or by 23. Find the leftmost digit of the original number if its units digit is 1 **(35 pts)**

3. At the Annual Dinner of the North Pole Mathematical Society, table number 2019 is shared between Mr. and Mrs. Claus and three other couples. This round table seats 8. None of the spouses want to sit next to each other. Further, no two ladies want to sit next to each other. Seatings that can be obtained from each other by rotating the table are considered different. How many possible seatings satisfy these constraints? **(25 pts)**



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