

Cal Poly Department of Mathematics

Puzzle of the Week

Nov 13 - 19, 2014

Allan challenges Betty to a game: Allan will secretly pick a polynomial with nonnegative integer coefficients. In each round of the game, Betty can give Allan any integer x and ask Allan for the value of the polynomial when evaluated at x . Betty wins if she can eventually guess the polynomial. Devise a strategy whereby *Betty wins after only the second round*.

Solutions should be submitted to Morgan Sherman:

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before next Thursday. Those with correct and complete solutions will have their names listed on the puzzle's web site (see below) as well as in next week's email announcement. Anybody is welcome to make a submission.

<http://www.calpoly.edu/~sherman1/puzzleoftheweek>

Solution:

Betty can play as follows: she first asks for $p(1)$, and the answer gives a maximum value for each coefficient. So now, if Betty then asks for the value at N , for any $N > p(1)$, the answer will give exactly the coefficients of the polynomial when it is written in base N .