

# The mathematical card game Krypto and reaching a level of proficiency where the rules break down

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Raymond Chen

There is a mathematical card game known as Krypto. The rules are simple: Each card has a numeric value. Six cards are dealt face-up in the center of the table: One card is designated as the *objective* card. The object of the game is to combine the remaining five cards in any order using the basic four arithmetic functions so that the result equals the objective. A player who believes that he has found a solution, calls *Krypto!* and has thirty seconds to show the solution. For example, if the objective is 6 and the other five cards are 1, 3, 7, 1, and 8, then you can achieve the result by using the expression  $7 + 1 - (8 / (3 + 1)) = 6$ . Fractions and negative numbers are not allowed. As a teenager, I wondered if I could write a computer program to solve Krypto hands, but I never got off the ground. Recently I discovered that, naturally, somebody else has already done it. My brother went to the state tournament for this game, where we discovered that he played at a whole different level from everybody else. For you see, my brother could solve nearly any hand in thirty seconds or less. Therefore, his strategy was merely to call *Krypto!* as soon as the cards were dealt, and then spend the next thirty seconds solving the puzzle. Using this technique, he could run the table. The scoring system for the game is such that the reward for winning a hand is far greater than the penalty for losing one, so the strategy pays off well. My brother didn't go the national tournament because we didn't want to pay for airfare and accommodations. I vaguely recall that the design flaw in the game was addressed at the national tournament by converting the head-to-head competition into a series of puzzles.

(While writing up this article, I discovered another Krypto tournament which redesigned the game to avoid this flaw.)

[Raymond Chen](#)

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