Express Riddler

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Riddle:

You're a contestant on the hit new game show, "You Bet Your Fife." On the show, a random real number (i.e., decimals are allowed) is chosen between 0 and 100. Your job is to guess a value that is *less than* this randomly chosen number. Your reward for winning is a novelty fife that is valued precisely at your guess. For example, if the number is 75 and you guess 5, you'd win a $5 fife, but if you'd guessed 60, you'd win a $60 fife. Meanwhile, a guess of 80 would win you nothing.

What number should you guess to maximize the average value of your fifing winnings?

Solution:

Call the number you choose x. Then, your fife is worth x dollars if you win. The probability that you win is the probability than the randomly chosen number is between x and 100, which is $100 - x$. The expected winnings is therefore $x(100 - x)$. This function is an inverted parabola with a maximum value for $x = 50$. At this value, the expected winnings is $25. So the solution is to guess **50**.