CS-49: Game Theory

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Problem 24.

You have the opportunity to make one bid on a widget whose value to its owner is, as far as you know, uniformly random between \$0 and \$100. What you do know is that you are so much better at operating the widget than he is, that its value to you is 80% greater than its value to him. (Yes, you don't know your own valuation!) If you offer more than the widget is worth to the owner, he will sell it. But you only get one shot. How much should you bid?

Suppose I bid $\$m$, and the owner agrees to sell the widget. That means that the value of the widget to the owner is less than $\$m$. Since the value is uniformly distributed, the expected value is $\$m/2$, making the widget's value to me $\$(m/2 + 0.8 \cdot m/2) = \$0.9m$. Therefore, if I bid and the owner agrees to sell, I'm most certainly making a loss! It's best to not bid.