

### Deal or No Deal

A number of cases containing dollar amounts are in front of the contestant, who selects one to be their case, and they are guaranteed to earn that amount of money if they just keep holding onto their case. The case values are as follows:

\$0.01	\$1,000.00
\$1.00	\$5,000.00
\$5.00	\$10,000.00
\$10.00	\$25,000.00
\$25.00	\$50,000.00
\$50.00	\$75,000.00
\$75.00	\$100,000.00
\$100.00	\$200,000.00
\$200.00	\$300,000.00
\$300.00	\$400,000.00
\$400.00	\$500,000.00
\$500.00	\$750,000.00
\$750.00	\$1,000,000.00

The contestant then selects 6 of the remaining 25 cases, revealed one at a time. Each figure appears in only one case, so any values revealed in this way are not in the contestant's case. This is followed by a "phone call" by "The Banker", a mysterious figure shown only in silhouette, who makes an offer to the contestant to buy their case.

If the contestant accepts the offer, the game ends, and the value of the case that he or she chose at the beginning of the game is then revealed along with the whereabouts of the remaining prizes. Should the contestant refuse the offer, they must choose five of the remaining cases to eliminate from consideration. The Banker makes another offer, and play continues as before. The Banker's offer may be higher or lower than the previous offer.

Subsequent rounds have the contestant withdrawing four, three, then two cases from play. Should the contestant continue to decline the Banker's offer after this point, they then eliminate one case each time (with an intervening offer from the Banker) until two cases are left. If the player rejects the final offer, the player wins whatever is in his or her chosen case. Occasionally, the player is given the opportunity to switch cases with the one remaining case before seeing their prize.

Q: If  $X$  is the random variable representing the amount of money in the contestant's case, calculate  $E(X)$ .

On the show airing October 19, 2007, the contestant selected case 22 and then opened briefcases containing...

(Round 1) \$75,000, \$500, \$.01, \$5, \$75, and \$300. Banker offers \$57,000; NO DEAL.

(Round 2) \$500,000, \$300,000, \$400,000, \$50,000, \$100,000. Banker offers \$39,000; NO DEAL

(Round 3) \$100, \$5,000, \$200, and \$10. Banker offers \$81,000; NO DEAL.

(Round 4) \$1,000,000, \$25,000, and \$750,000. Banker offers \$18,000; NO DEAL.

(Round 5) \$1,000, \$1. Banker offers \$24,000; NO DEAL.

(Round 6) \$50. Banker offers \$29,000; NO DEAL.

(Round 7) \$10,000. Banker offers \$42,000; DEAL.

Q: How do the Banker's offers compare to the expected value at each round?

Q: Evaluate the contestant's strategy. Can you come up with a rule of thumb for when you should accept the deal or not accept the deal (note: there is a bit of subjectivity in this question).