

## MCDONALD'S MONOPOLY

Every year McDonald's promotes their monopoly game. They like to claim that there is a 1 in 4 chance that you are a winner. We could do an very in-depth study on the odds and value of the other prizes but let's look at the expected value of just the instant win food prizes.



| <b>Win Item</b>             | <b>Probability</b> | <b>Average cost of the winning item</b> |
|-----------------------------|--------------------|---|
| Medium Fries                | 1/9                | \$1.75                                  |
| Quarter Pounder with Cheese | 1/44               | \$3.60                                  |
| Small McCafe or Smoothie    | 1/44               | \$2.40                                  |
| McFlurry                    | 1/44               | \$2.55                                  |
| Breakfast Sandwich          | 1/22               | \$2.65                                  |

The cheapest food item that gets you 2 pieces was a large drink which has an average cost of \$2.

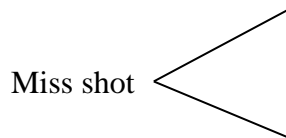
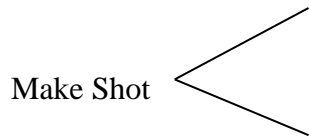
Use the steps below to find the expected value of winning an instant win monopoly piece from a large drink.

- 1) Take each winning food item and multiply the probability with the cost. Add all of these together. This will represent the 'money' (I know it is actual food items but we are comparing each different food item in terms of its cost) you could win.
- 2) Since you get two pieces per item multiply your answer from the previous question by 2
- 3) The large drink cost you \$2 so subtract \$2 from your expected winnings. This is your expected value
- 4) Explain why your answer to number 3 is negative. Explain how expected value could be positive.

## EXPECTED VALUE IN A GAME

Laura created a game where people have to toss a ball into a cup. Players get 3 chances to toss a ball into a cup. If they get all three balls then they win a gold fish, if they get two they get a soda and if they only get one then they get a piece of fun sized candy. If they do not make any balls into the cup then they do win a prize Assume that there is an equal chance of a hit or miss.

1. Create a tree diagram to determine the total possible outcomes (it has been started for you).






2. Find the probability of the following (hint the denominators should be out of 8)

|                     |                |                          |                 |
|---------------------|----------------|--------------------------|-----------------|
| Winning a gold fish | Winning a soda | Winning a piece of candy | Winning nothing |
|---------------------|----------------|--------------------------|-----------------|

3. Laura knows that a gold fish costs her \$0.29, a soda costs her \$0.21 and a single piece of candy costs her \$0.12. Use the probabilities from above to determine what the expected value of one play is.

4. Based on your answer from #2 what should Laura charge for people to play her game?

5. If Laura is expecting 50 people to play her game how many of each prize should she buy?

|   |  |   |
|---|--|---|
|  Gold Fish |  Soda |  Piece of Candy |
|---|--|---|