1.6 Expected Value

Expected Value tells you how much you stand to _____ or _____ in a given situation, by multiplying each possible _____ and its _____ _____, and then finding the _____.

Outcome: _____

How to Calculate Expected Value:

Example 1: Expected Value of independent events: Consider a die-rolling game that costs $10 per play. A 6-sided die is rolled once, and your cash winnings depend on the number rolled. Rolling a 6 wins you $30; rolling a 5 wins you $20; rolling any other number results in no payout.

Understanding	Process
	1. Familiarize yourself with the situation
	2. Enumerate the possible outcomes
	3. Determine the probability of each outcome
	4. Calculate the expected value
	5. Understand the implications of the expected value

Finding Expected Value on a calculator when the each event is left to chance:
1. Enter overall outcome in L1
2. Enter each theoretical probability in L2
3. STAT→ Calc→ 2-Var Stats→ Type "L1, L2" → ENTER
4. The expected value is the MEAN: _____

Example 2: Expected value of a DECISION:
A company is about to launch its new fast food for sale in supermarkets throughout Arkansas. The research department is convinced that a special type of chicken wings will be a great success. The marketing department wants to launch an intensive advertising campaign. The advertising campaign will cost $1,000,000 and if successful will produce $4,800,000 profit. If the campaign is unsuccessful (25% chance), the profit is estimated at only $1,800,000. If no advertising is used, the revenue is estimated at $3,500,000 with probability 0.6 if customers are receptive and $1,500,000 with probability 0.4 if they are not.

a) Draw the associated decision tree.

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b) What course of action should the company follow in launching the new product if they want to maximize the expected value?

Example 3: The probabilities of having a certain number of TVs in a household are given by the table below:

Number of TVs	0	1	2	3	4	5
Probability	0.08	0.15	0.28	0.17	0.2	0.12

a) How many TVs do you expect to find in a randomly selected house?

Example 4: There are 500 tickets in a raffle. There are 10 tickets that win you a $25 gift card to McDonalds, 15 tickets win you a $10 t-shirt, and 20 tickets win a $3 bag of candy. If the tickets sell for $2 each, what is the expected value of the raffle? Would you play?

Example 5: Five people can play a card game at a carnival. It costs $15 to play. The Winner gets $30, the second place player gets $15, and the other players get nothing. What is the expected value of the card game? Would you play?

Example 6: A club is doing a bake sale at school they bought cookies for $1 apiece. On the first day the cookies will be sold for $3, on the second day the cookies will be sold for $2, and if they are not sold by the end of the second day, they will be donated to a food bank. The probability of the cookies selling on the 1st day are 0.68, the probability of them selling on the 2nd day are 0.15. What is the expected value of the bake sale?

b) Should the club increase or decrease their prices?