

CLUTCH

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DISCRETE

- Discrete variables are _____ variables that are broken down into discrete chunks
 → Anything countable: profit (-\$5, \$20, \$100,...), first digit (0,1,2,...), number of kids (0,1,2,...)
- _____ variables are quantitative variables that cannot be broken down into discrete chunks
 → Anything measured: weights, volume, money, time, etc.
- The easiest way to distinguish _____ problems is to look for a table like the one below:
 → This table will include two things: **(1)** the variable name or **X**, and **(2)** the probability of each outcome or **P(X)**

Discrete Random Variable X	0	10	20	30	40
Probability P(X)	.10	.20	.40	.20	.10

- The total sum of the probabilities must equal _____
 → Remember: $P(S) = 1$ and $P(A)$ has to be between _____

EXAMPLE 1: What is the missing probability within this table?

Lottery Profits

Profit	-\$1.00	\$0.00	\$5.00	\$1,000,000.00
Probability	.40	.35	?	.001

EXAMPLE 2: What is the probability of at least breaking even if you played the lottery game from Example 1?

EXAMPLE 3: What is the probability that you win at most \$10.00 if you played the lottery game from Example 1?

PRACTICE 1: What is the probability of having more than 4 drinks in day on the weekend?

Drinks	0	1	2	3	4	5	6
Probability	.50	.31	.09	.05	.03	.01	.01

PRACTICE 2: Referring to Practice 1, what is the probability of having at most 2 drinks?

PRACTICE 3: Referring to Practice 1, what is the probability of having at between 2 and 8 drinks?

PRACTICE 4: Your friends play a poker game. What is the probability that you win money from them?

Profits	-\$5	\$0	\$10	\$50	\$100
Probability	.60	.20	.10	.08	.02

PRACTICE 5: What is the probability that you don't end up winning anything?

PRACTICE 6: What is the probability that you win more than \$100?

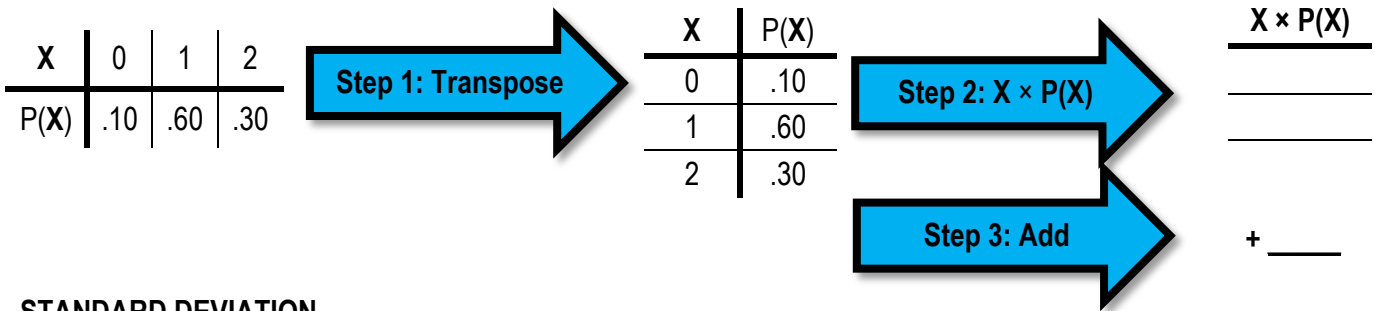
MEAN

- When there are potential outcomes and probabilities associated with them, you can find an _____
 → Expected value is another way of describing the _____ of the distribution for a DRV

$$E(x) = \mu_x = \sum x_i p_i$$

x_i = each observation
 p_i = probability of each x_i

- Step 1: To keep your sanity, go ahead and _____ any horizontal table
- Step 2: Create an extra column with $X \times P(X)$
- Step 3: Add up all the values in the $X \times P(X)$ column

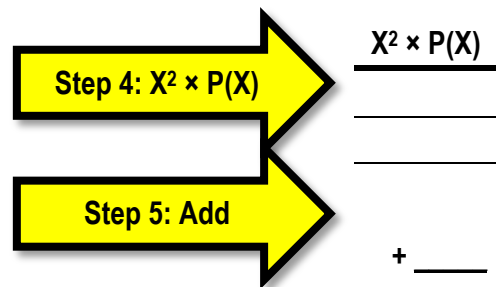


STANDARD DEVIATION

- Just like you can find the mean of the probability distribution for a DRV, you can also find a _____
 → Remember: the standard deviation is simply a measure of _____

$$\sigma_x = \sqrt{\sum (x_i - \mu)^2 p_i} = \sqrt{\sum x_i^2 p_i - \mu_x^2}$$

- Step 4: Create another extra column with $X^2 \times P(X)$
- Step 5: Add up all the values in the $X^2 \times P(X)$ column
- Step 6: Plug in your values and find the _____



EXAMPLE 1: In a particular game of slots, you pay \$2 to play. There's a 90% chance of losing. There's a 9% chance that you win \$5. If you win the jackpot, you get to take home \$1,000,000 on the spot. How much do you expect to win if you play this game and what is the standard deviation of this discrete random variable distribution?

CH.4: THE DISCRETE RANDOM VARIABLE

PRACTICE 1: What is the mean and standard deviation for the following distribution for the number of drinks you have during a night on the weekend?

Drinks	0	1	2	3	4	5	6
Probability	.50	.31	.09	.05	.03	.01	.01

PRACTICE 2: What are the mean and standard deviation for the following probability distribution of your profits in a particular betting game?

Profits	-\$5	\$0	\$10	\$50	\$100
Probability	.60	.20	.10	.08	.02

PRACTICE 3: A particular game of slots costs \$1 to play and it has a 70% chance of losing. If you win, you either get \$5 or the jackpot of \$1,000. There's a 29.99% chance of winning \$5. What are the expected profit for this game and the corresponding variance for the distribution?