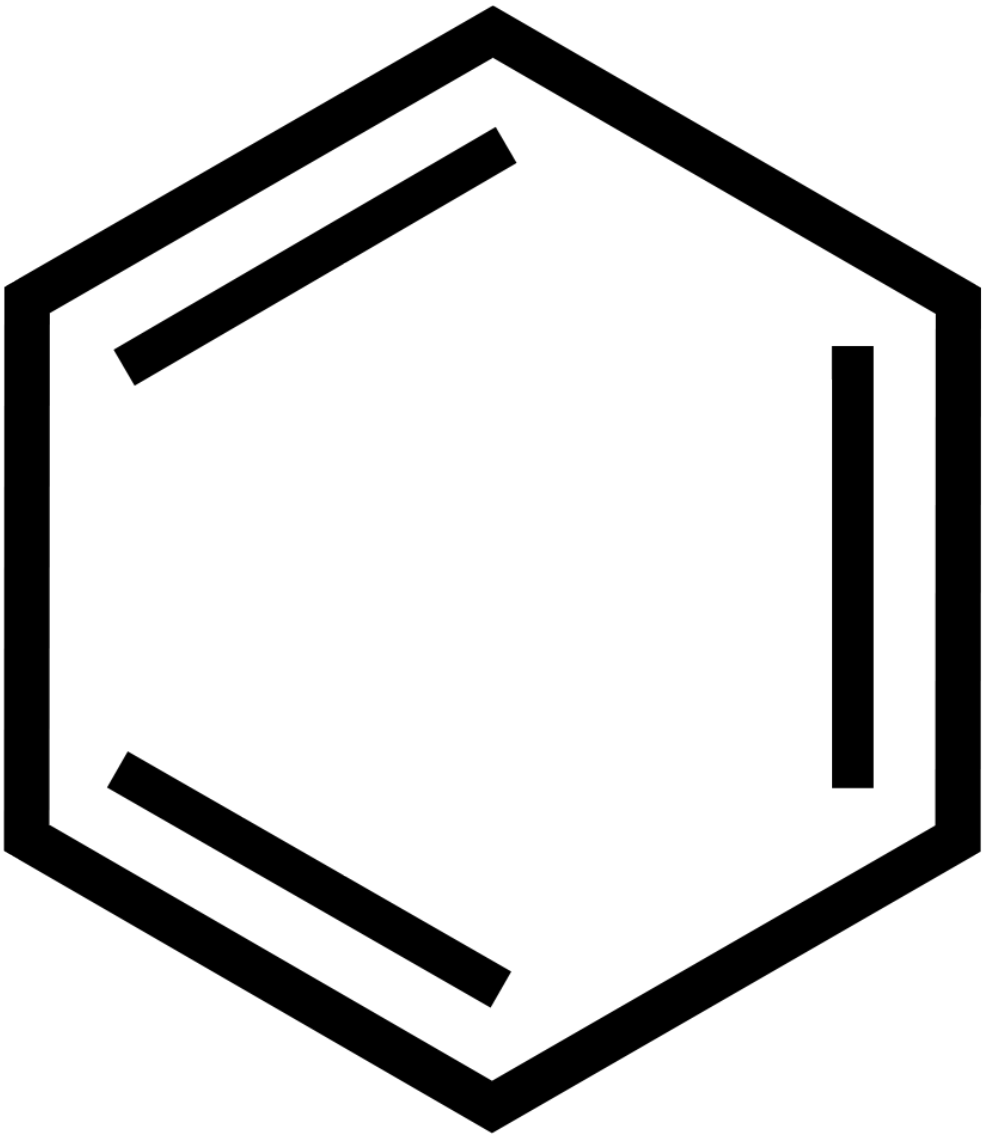

CLUTCH

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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

$$E(\mathbf{x}) = \mu_x = \sum \mathbf{x}_i p_i$$

$\mathbf{x}_i$ = each observation
$\mathbf{p}_i$ = probability of each $\mathbf{x}_i$

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

X	0	1	2
P(**X**)	.10	.60	.30

Step 1: Transpose

X	P(**X**)
0	.10
1	.60
2	.30

Step 2: X × P(X)

X × P(X)
_____
_____

Step 3: Add

+ _____

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 _____

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

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

Step 4: X^2 × P(X)

X^2 × P(X)
_____
_____

Step 5: Add

+ _____

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?

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?