# First Slide

Our Topic is Logical Paradoxes. I am Mahnam, and I will be presenting today with my teammate Jawad.

# Second Slide

Today we will be discussing a couple of things. First of all, we will be giving a brief introduction as to what paradoxes really are. Then a deep dive into a couple paradoxes, such as the Epimenides of Creten, Jourdians Card and the barber paradox. Then a conclusion and time for questions.

# Third to Fifth Slide

What are paradoxes?

They are like puzzles, but with all the wrong, jagged pieces. Each piece joins differently to form a new answer each time you try to make the whole picture.

Now let's take an example to start. Paradox of Heap is a good place to start. Imagine a single grain of sand. One, singular. Is it a heap of sand? Probably not. Now, let's add another grain. Is it a heap now? Seems too small, right? Lets try adding another, and another. Does this count as a heap?

Not really, its just four grains of sand.

So… when does it exactly count as a Heap? If I add fifty more? Or a hundred…? See, you don't really have a number in mind. Maybe if I continue to add a grain one by one, at one point, some will agree it is a heap, some will agree after a couple more additions that it is a heap. Some might call it a heap after a thousand grains, and some after tens of thousand.

From the moment the first person called it a heap till the last, it is all considered a gray area. A no man's land, if you will.

# Sixth Slide

Our first paradox is the paradox of Epimenides the Creten.

# Seventh Slide

The paradox of Epimenides the Cretan is an example of a self-referential paradox, where a statement's truth or falsity depends on the truth or falsity of the statement itself.

If we assume that Epimenides' statement is true, then it means that all Cretans, including Epimenides himself, always lie. However, if Epimenides is lying, then his statement "All Cretans are liars" is false, which means that not all Cretans are liars, including Epimenides himself.

This leads to a contradiction: if Epimenides' statement is true, it's false, and if it's false, it's true.

# Eight Slide

The paradox of Epimenides the Cretan hasn't been definitively "solved" in the sense of a single, universally accepted resolution. However, various approaches have been proposed to understand and mitigate the paradox.

# Nine Slide

**Contextual Interpretation:**

* One approach is to consider the context of the statement. "All Cretans are liars" might not be a universal truth but rather a generalization about Cretan tendencies or a specific cultural stereotype.
* In this interpretation, the statement does not necessarily mean that every single Cretan always lies. It could simply mean that many Cretans are prone to exaggeration or deception.

**Logical Analysis:**

* Logicians, having explored the paradox through formal logic, have identified the self-referential nature of the statement as the root cause of the contradiction.
* So they argue that self-referential statements can lead to paradoxes and should be avoided in formal logic.

**Pragmatic Approach:**

* A pragmatic approach suggests that the paradox arises from a misunderstanding of language and communication.
* It's argued that statements like "All Cretans are liars" are often used metaphorically or hyperbolically, and shouldn't be taken literally.

# Tenth Slide

Moving on to the Jourdians card paradox

# Eleventh Slide

Jourdain's card paradox, also known as the postcard paradox, is a variation of the liar paradox. It involves a card with a statement on each side:

* **With the Front saying:** "The sentence on the other side of this card is TRUE."
* **And the Back that says:** "The sentence on the other side of this card is FALSE."

This creates a paradoxical situation:

1. **Lets say, for now, the front is true:**
   * Then the back statement is true as well.
   * But if the back statement is true, then that means the front statement is now false.
   * This contradicts the initial assumption that the front statement is true.
2. **On the other hand, if we take the front side as false:**
   * Then the back statement is false.
   * But if the back statement is false, then the front statement is now true.
   * This again contradicts the initial assumption that the front statement is false.

No matter which statement we assume to be true, we end up with a contradiction. This paradox, just like the previous one, highlights the limitations of self-referential statements.

# Twelfth Slide

Since this is also a self-referential statement, just like the paradox of Epimeides the Creten, this paradox also does not have a definitive solution. But, it also has some approaches to a solution.. Lets look at them now

# Thirteen Slide

**Limiting Self-Reference:**

* One approach is to restrict these types of self-referential statements that are allowed in a formal system. By imposing certain limitations, we can avoid paradoxes like Jourdain's card.
* However, this approach can limit the expressive power of the language.

**Paraconsistent Logic:**

* Paraconsistent logic is a type of non-classical logic that allows for the coexistence of contradictory statements without leading to a logical explosion where anything can be proven true. Specifically, paraconsistent logic is the subfield of logic that is concerned with studying and developing "inconsistency-tolerant" systems of logic, purposefully excluding the principle of explosion.
* In the case of Jourdain's card paradox, paraconsistent logic would allow for the contradictory statements on the card to coexist without leading to a logical explosion.

**Pragmatic Approach:**

* This suggests that the paradox arises from a misunderstanding of language and communication.
* It's argued that such self-referential statements often lead to meaningless or nonsensical results, and therefore, they should be avoided.

# Fourteen Slide

The last paradox we will be discussing is the barber paradox

# Fifteen Slide

The barber paradox is also a classic example of a self-referential paradox, similar to the liar and the card paradox. This involves a hypothetical scenario:

**The scenario is that:**

* In a certain village, there is a barber who shaves all and only those men in the village who do not shave themselves.

**So, the question arises:** Does the barber shave himself?

* **If the barber shaves himself:** Then he is one of those men who shave themselves, which means he shouldn't be shaved by the barber, that is himself (as the barber only shaves those who don't shave themselves).
* **If the barber doesn't shave himself:** Then he is one of those men who don't shave themselves, which means the barber, that is himself, should shave him.

Both possibilities lead to a contradiction, hence the paradox.

# Sixteen Slide

The barber paradox arises from a self-referential statement that leads to a logical contradiction. However, there is no definitive solution to this paradox, as it stems from the inherent limitations of self-reference in formal logic.

The paradox highlights the importance of carefully defining the scope and conditions of a statement to avoid such contradictions. In the case of the barber paradox, the problem lies in the assumption that such a barber can exist.

The paradox can be resolved by recognizing that the statement "there exists a barber who shaves all and only those men in the village who do not shave themselves" is inherently contradictory and cannot be true. Therefore, such a barber cannot exist.

# Seventeen Slide

These paradoxes highlight the limitations of self-reference and the potential for logical inconsistencies when dealing with such statements. They demonstrate how seemingly simple statements can lead to complex and paradoxical situations.

Ultimately, these paradoxes remind us of the complexities of language and thought, and the importance of careful and critical thinking. They encourage us to be mindful of the potential pitfalls of self-reference and to strive for clarity and precision in our communication.

# Eighteen Slide

That is all from our side. Now, are there any questions?

# Nineteen Slide

Thank you.