

2-3: Deductive Reasoning

“I WILL ...

...distinguish the difference between inductive and deductive reasoning.”

I. Inductive vs. Deductive Reasoning

- A. We use inductive reasoning to investigate and discover things about our world.
- B. Since the conjectures we make using our inductive reasoning is based on our fallible observation skills, we can be wrong.
- C. We can search for a counterexample to disprove our conjectures.
- D. In mathematics, we use our deductive reasoning to prove our conjectures beyond all uncertainty.
- E. In Inductive Reasoning, it does not always lead to the truth whereas Deductive Reasoning will always lead to the truth.

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| <p>Ex 1: In this statement, “In this statement, “An apple a day keeps the doctor away. Joe at an apple everyday. Dr. Dre stayed away” is a form of inductive or deductive reasoning?</p>   | <p>Ex 2: In this statement, “My dad has blond hair. My brother has blond hair. Therefore, everyone I am related to has blond hair” is a form of inductive or deductive reasoning?</p>                |
| <p>Ex 3: In this statement, “There is a myth that you can balance an egg on its end only on the spring equinox. A person was able to balance an egg on July 8, September 21, and December 19. Therefore this myth is false” is a form of inductive or deductive reasoning?</p> | <p>Your Turn: In this statement, “Texas is a great state. The University of Texas is in Texas. So, University of Texas is a great state college.” is a form of inductive or deductive reasoning?</p> |

II. More on Deductive Reasoning

- A. Law of Detachment is Latin for “Modus Ponens” = Affirming the Antecedent
- B. Denying the Consequent is Latin for: “Modus Tollens”
- C. Law of Syllogism is the Chain Rule

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| <p>Ex 4: Use the statements below to describe “Law of Detachment.”<br/>A: “If Mr. Dang had chalk on his fingers and then he had been playing billiards.”<br/>B: “Therefore, he has been playing billiards.”<br/>C: “If he had chalk between his fingers upon returning from the billiard place.”</p> | <p>Ex 5: Determine if the conjecture is valid by the Law of Detachment. “If a student passes his classes, the student is eligible to play sports. Ramon passed his classes.”<br/>Conjecture: Ramon is eligible to play sports.</p>  |
| <p>Ex 6: Determine if the conjecture is valid by the Law of Detachment. “I know if it is raining outside my workplace, then water is being added to my pool.” Conjecture: It is raining at my house.</p>   | <p>Your Turn: Determine if the conjecture is valid by the Law of Detachment. “In the World Series, if a team wins four games, then the team wins the series. The Red Sox won four games in the 2004 World Series.” Conjecture: The Red Sox won the 2004 World Series.</p> |
| <p>Ex 7: Use the statements below to describe “Law of Syllogism”.<br/>A: “If I have nightmares, then I will get very little sleep.”<br/>B: “If I eat pizza after midnight, then I will get very little sleep.”<br/>C: “If I eat pizza after midnight, then I will have nightmares.”</p>              | <p>Ex 8: Determine if the conjecture is valid by the Law of Syllogism. “If a figure is a kite, then it is a quadrilateral. If a figure is a quadrilateral, then it is a polygon.”<br/>Conjecture: If a figure is a kite, then it is a polygon.”</p>                       |
| <p>Your Turn: Determine if the conjecture is valid by the Law of Syllogism. “If a number is divisible by 2, then it is even. If a number is even, then it is an integer.<br/>Conjecture: If a number is an integer, then it is divisible by 2.”</p>  |   |