



# Logic for problem solving

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# Introduction to Logic

- ▶ Logic is an important tool in the analysis and presentation of arguments
- ▶ Need to understand the difference between good and bad argument
- ▶ Need to understand what is legitimate and what is illegitimate to draw a specific conclusion from what we already have
- ▶ Logic – the study of argumentation
- ▶ Logic is the science that explains what conditions must be fulfilled in order that a proposition may be proved, if it admits of proof.
- ▶ Propositions- Quantitative and Qualitative

# Some terminologies

- ▶ Argument consists of two parts- ***premises and the conclusions***
- ▶ Premises- what we presuppose
- ▶ Conclusion- what we conclude from the premises
- ▶ Example-
  - ▶ No medieval king had absolute power over his subjects
  - ▶ Louis VII of France was a medieval king
  - ▶ **So, Louis VII of France did not have absolute power over his subjects**

# Some terminologies

- ▶ Example
  - ▶ No faculty member of CUTM has absolute power over their students
  - ▶ Dr Das is a faculty member in CUTM
  - ▶ So, Dr Das does not have absolute power over his/her students

# Some terminologies

- ▶ Valid and invalid argument
- ▶ Valid argument - An argument where the conclusion really follows from the premises
- ▶ Example
  - ▶ No student is humble
  - ▶ A is a student
  - ▶ So A is not humble
- ▶ Invalid argument – An argument that is not valid

# Some terminologies

- ▶ Example of Invalid Argument-
  - ▶ No medieval king had absolute power over his subjects
  - ▶ Louis VII of France is a great horseman
  - ▶ **So, Louis VII of France did not have absolute power over his subjects**

# Some terminologies

- ▶ Inductive and Deductive Argument
  - ▶ Deductive Arguments- An argument in which the truth of the premises absolutely guarantees the truth of the conclusion
  - ▶ Its just not possible that the premises is true and conclusion is false
- ▶ Example-
  - ▶ No A is B
  - ▶ C is A
  - ▶ So C is not B

# Features of Deductive argument

- ▶ If you use deductive argument, you can not make any new mistakes
- ▶ The only way of conclusion to be false for a deductive argument is one of your assumption is false
- ▶ Deductive argument is valid or not can be determined by looking at the form of argument
- ▶ Example-
  - ▶ No A is B
  - ▶ C is A
  - ▶ So C is not B

# Features of Deductive argument

- ▶ Scientists first collect data and then come to the conclusion that which theories are right or wrong
- ▶ We only need data and some valid argument which can be shown independently on any theories and ideas
- ▶ Then draw conclusions

# Inductive Argument

- ▶ An argument where the truth of the premises gives good reason to believe the conclusion, but does not absolutely guarantee the truth of the conclusion
- ▶ Example- None of the medieval texts we have studied argues against the existence of God (May be argument is made but not transmitted to us)
- ▶ So, nobody in the Middle Ages argued against the existence of God