§ 1.D ANALYZING ARGUMENTS

INDUCTIVE :   SPECIFIC PREMISES ⟶ GENERAL CONCLUSION.

DEDUCTIVE :   GENERAL PREMISES ⟶ SPECIFIC CONCLUSION

INDUCTIVE :   STRONG OR WEAK ARGUMENT?   SUBJECTIVE.

DEDUCTIVE :   (1) DOES CONCLUSION FOLLOW FROM PREMISES? (i.e. IS ARGUMENT VALID?)

(2) ARE PREMISES TRUE?   ⟵   TWO DIFF QUESTIONS !!
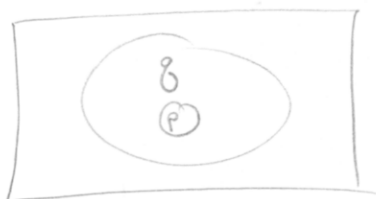
IF BOTH (1),(2) YES: ARGUMENT IS   SOUND.

EXAMPLES :   VALID , SOUND

VALID , UNSOUND

INVALID , BUT TRUE !

CONDITIONAL DEDUCTIVE ARGUMENTS

IF P THEN q.

4 BASIC CONDITIONAL ARGUMENTS

$$\frac{\begin{array}{c}p \Rightarrow q \\ p\end{array}}{q}$$

VALID

$$\frac{\begin{array}{c}p \Rightarrow q \\ \neg q\end{array}}{\neg p}$$

VALID

$$\frac{\begin{array}{c}p \Rightarrow q \\ q\end{array}}{?}$$

INVALID

$$\frac{\begin{array}{c}p \Rightarrow q \\ \neg p\end{array}}{?}$$

"MODUS TOLLENS"

More Venn Diagrams and Validity

1. Below is a set of propositions. Draw a Venn diagram that represents all of the information in the propositions and use it **(and no other assumptions)** to answer the questions below.

   All dancers are strong. All professional tennis players are strong. Some dentists are strong. All dentists but no dancers or tennis players fill cavities in teeth.

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   Could there be dentists that are professional tennis players?
   Could there be a dancer that is a professional tennis player?
   Could there be professional tennis players that fill cavities
   in teeth?  Could there be people who fill cavities in teeth
   and are strong people?
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Test the following arguments for validity. You must justify your answer.

2. All Martians eat meat
   No meat eaters are green.
   ∴ No Martians are green.

3. Some babies don't cry
   All babies are human.
   ∴ Some humans don't cry

4. None of the British Royal family got married last year
   Prince Charles is a member of the British Royal family
   ∴ Prince Charles didn't get married last year.

5. No Democrats are Republicans
   No Republicans are Green Party members
   No Green Party members are conservative
   Some Green Party members are Democrats
   ∴ No Democrats are conservative

6. All aardvarks eat berries
   All animals that eat berries have four legs
   No bird is an aardvark
   ∴ No bird eats berries

7. All aardvarks eat berries
   All animals that eat berries have four legs
   No four legged creature can fly
   ∴No aardvarks can fly

8. Some mammals fly.
   All flying mammals eat insects
   Some mammals don't eat insects
   ↗ Some mammals don't fly

9. Penguins are found only in Antarctica
   No orchid is found in Antarctica
   ↙ No penguin is an orchid.

10. Some birds fly and some don't
    Birds that fly have small wings
    ↙ All birds have small wings.

11. Doctors are rich
    Rich people are conservative
    Fred is conservative
    ↙ Fred is a doctor

12. If you succeed, then you must be ambitious
    Lazy people are not ambitious
    All logic students succeed
    ↙No logic student is lazy

13. No genius is tidy
    Some children are geniuses
    ↙ Some children are not tidy

To: Instructors of Math 150
From: Shelley Ring, course supervisor

Please include the negations of quantified statements and distribute the sheet of practice problems labeled **FIND THE NEGATIONS OF THE FOLLOWING STATEMENTS**. Define the negation of a statement (as best you can) and show students how each of the following negations of the four types of quantified statements (use specific examples not letters) can be verified using a Venn diagram. Thus, derive and list the following table:

Statement	Negation
All A are B	Some A are not B
Some A are B	No A are B
No A are B	Some A are B
Some A are not B	All A are B

Students should note how the statements are paired.

FIND THE NEGATIONS OF THE FOLLOWING STATEMENTS

1. All snakes are poisonous.

2. Some auto mechanics are incompetent

3. No dogs can talk.

4. Some personal items are not covered by this insurance policy.

5. All married couples file a joint tax return.

6. Some scientists believe that an asteroid collision led to the extinction

   of dinosaurs

7. All polygons have four sides.

8. All modern art is difficult to understand.

9. Some factories emit toxic waste.

10. Some people are unable to deny that the war in Iraq is unsuccessful.

11. All Frenchmen are unable to deny that their cooking is bad.

12. No flowers are ugly.