Two Types of Arguments

Inductive Reasoning

specific premises → general conclusion

Example:

Premise: Bluebirds fly.
Premise: Hummingbirds fly.
Premise: Cardinals fly.
Conclusion: All birds fly.

Two Types of Arguments

Deductive Reasoning:

general premises → specific conclusion

Example:

Premise: All doctors are intelligent.
Premise: Dr. Jones is a doctor.
Conclusion: Dr. Jones is intelligent.

Example

- Identify the argument as inductive or deductive.

  - July is windier than September. The wind must blow more often in the summer than in the fall.

Example

- Identify the argument as inductive or deductive.

  - Every coach must know his sport well. Marty Wright is a baseball coach, so Marty Wright knows baseball well.

Example

- State whether the following argument is inductive or deductive.

- Premise: 2+3=5

- Premise: 5+4=9

- Premise: 7+6=13

- Conclusion: The sum of an even integer and an odd integer is an odd integer.

Evaluating Arguments

An inductive argument does not prove its conclusion true, so it is evaluated based on its **strength**.

- An argument is **strong** if a compelling case is made for its conclusion.

- An argument is **weak** if the conclusion is not well supported by its premises.

Evaluating Arguments

Consider the following algebraic expression: $n^2 - n + 11$

Based on the test cases to the right, it appears that $n^2 - n + 11$ will always equal a prime number when $n \geq 0$.

Or does it?

How about $n = 11$?

$11^2 - 11 + 11 = 121$
(a non-prime counterexample)

n	$n^2 - n + 11$	
0	$0^2 - 0 + 11 = 11$	(prime)
1	$1^2 - 1 + 11 = 11$	(prime)
2	$2^2 - 2 + 11 = 13$	(prime)
3	$3^2 - 3 + 11 = 17$	(prime)
4	$4^2 - 4 + 11 = 23$	(prime)
5	$5^2 - 5 + 11 = 31$	(prime)

Evaluating Arguments

Apply two criteria to evaluate a deductive argument.

- The argument is **valid** if its conclusion follows necessarily from its premises, regardless of the truth of the premises or conclusion.

- The argument is **sound** if it is valid and its premises are all true.

A Venn Diagram Test of Validity

The following tests the validity of a deductive argument with a Venn diagram:

1. Draw a Venn diagram that represents all the information contained in the premises.

2. If the Venn diagram contains the conclusion the argument is valid; otherwise, it is not.

A Venn Diagram Test of Validity

All politicians are married.

Vice President Harris is a politician.

Therefore, she is married.
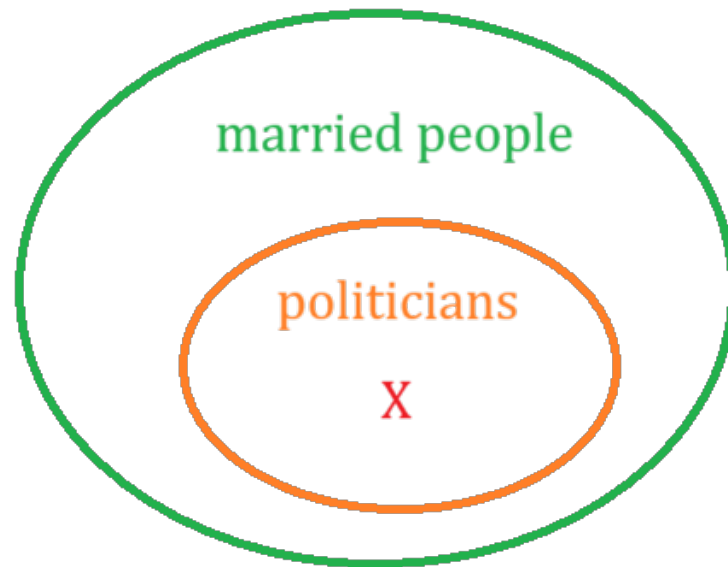
Example

- Draw a Venn diagram of the following to determine whether the argument is valid. Then determine whether the argument is sound.

  - Premise: All Islands are tropical.
  - Premise: Iceland is an island.
  - Conclusion: Iceland is tropical.

Example

■ Draw a Venn diagram of the following to determine whether the argument is valid. Then determine whether the argument is sound.

■ Premise: Deep fried foods increase cholesterol.

■ Premise: Peaches do not increase cholesterol.

■ Conclusion: Peaches are not deep fried foods.

Basic Forms of Conditional Deductive Arguments

FOUR BASIC CONDITIONAL ARGUMENTS

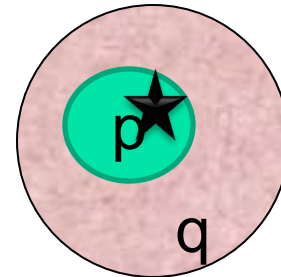|	Affirming the Hypothesis	Affirming the Conclusion	Denying the Hypothesis	Denying the Conclusion
Structure	If p, then q. p is true. q is true.	If p, then q. q is true. p is true.	If p, then q. p is not true. q is not true.	If p, then q. q is not true. p is not true.
Validity	Valid	Invalid	Invalid	Valid

Basic Forms of Conditional Deductive Arguments

Affirming the Hypothesis:

If one gets a college degree, then one can get a good job.

Marilyn has a college degree.

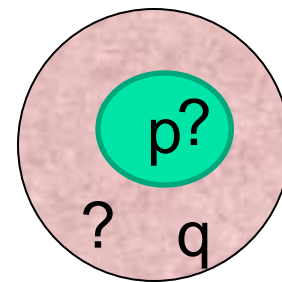Marilyn can get a good job.

Valid

Basic Forms of Conditional Deductive Arguments

Affirming the Conclusion:

If one gets a college degree, then one can get a good job.

Marilyn gets a good job.

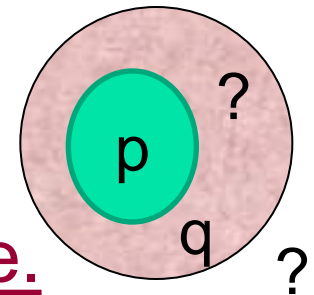Marilyn has a college degree.

Invalid

Basic Forms of Conditional Deductive Arguments

Denying the Hypothesis:

If one gets a college degree, then one can get a good job.

Marilyn does not have a college degree.

Marilyn cannot get a good job.
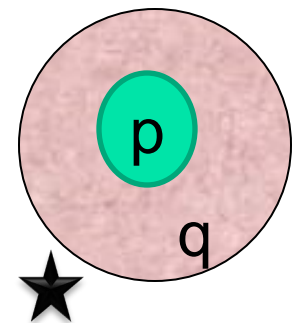
p

?

q

?

Invalid

Basic Forms of Conditional Deductive Arguments

Denying the Conclusion:

If one gets a college degree, then one can get a good job.

Marilyn can not get a good job.

Marilyn did not get a college degree.

Valid