II. Law of Contrapositive

Also known as "modus tollens."

A. General Form

If *p*, then *q*
not *q*
Therefore, not *p*

B. Example

If you are a parent, then you have children.
You have no children.
Therefore, you are not a parent.

C. Alternate form

1. No *p* is *q*
But *r* is *q*.
Therefore, *r* is not *p*.
Example:
No triangle is a rectangle.
A square is a rectangle.
Therefore, no square is a triangle.

D. Additional examples with explanations

1. If the Steelers win Sunday, they win their division.
The Steelers didn't win the division.
So they didn't win Sunday.

Translate this example to "classic" Law of Contrapositive form like this:
If <u>the Steelers win Sunday</u>, then <u>they win the division</u>.
     p   *q*
<u>The Steelers did not win the division</u>.
          not *q*
Therefore, <u>they didn't win Sunday</u>.
                not *p*

2. Every even number is divisible by 2.
So 9 is not an even number because it's not divisible by 2.

Translation to standard Law of Contrapositive format:
If a number is even, then it is divisible by 2.
9 is not divisible by 2.
So 9 is not an even number.

3. No tame animals are carnivorous, so my cat is not tame, for she eats meat.

Translate to Rule of Detachment form:
If an animal is not tame, then it is carnivorous.
My cat eats meat.
Therefore, my cat is not tame.

4. To run for President of the United States, you must be at least 35 years old. Smith is only 33; so Smith is not eligible to run for President.

Translate to Rule of Detachment form:
If you run for President, then you must be at least 35.
Smith is only 33.
Therefore, Smith is not eligible to run for President..

5. To be a suspect in the murder, Simpson must have a motive.
Simpson has no motive.
So Simpson is not a suspect.

Translation:

If _____, then _____.

_____

_____

6. Donald Trump is not a true Republican because a true Republican is a conservative, and Trump is not a conservative.

Translation:

If _____, then _____.

_____

_____

7. No Democratic candidate believes in limited government. Since Hillary Clinton is the Democratic candidate for president, I can't support her. She doesn't believe in limited government.

Translation:

If _____, then _____.

_____

_____

E. Fallacy Associated with the Law of the Contrapositive

Affirming the Consequent Fallacy

General Form

If *p*, then *q*
q
Therefore, *p*

Example of the Fallacy

If the Steelers win Sunday, they win their Division.
The Steelers won their division.
Therefore, they must have won Sunday.

Explanation: The conclusion doesn't necessarily follow from the premises because there could have been another way the Steelers could win the division.

8. School guidance counselor: "If you take Fine Arts next year, you won't be able to stay in the Honor Society. Let me know by tomorrow what you decide to do."
Student the next day: "I don't care about staying in the Honor Society."
Counselor: "So you're taking Fine Arts."

Translation:

If _____, then _____.

_____

_____

Answers to Completions

1. To be a suspect in the murder, Simpson must have a motive.
Simpson has no motive.
So Simpson is not a suspect.

Translation:

If **you are a suspect in a murder**, then __**you have a motive**__ .

__**Simpson has no motive.**__

__**Simpson is not a suspect.**__

2. Donald Trump is not a true Republican because a true Republican is a conservative, and Trump is not a conservative.

Translation:

If **you are a true Republican**, then __**you are a conservative**__ .

__**Trump is not a conservative.**__

__**Trump is not a true Republican.**__

3. No Democratic candidate believes in limited government. Since Hillary Clinton is the Democratic candidate for president, I can't support her. She doesn't believe in limited government.

Translation:

If **you are a Democratic candidate**, then **you don't believe in limited government.**

Hillary Clinton is the Democratic candidate.

She doesn't believe in limited government.

4. School guidance counselor: "If you take Fine Arts next year, you won't be able to stay in the Honor Society. Let me know by tomorrow what you decide to do."
Student the next day: "I don't care about staying in the Honor Society."
Counselor: "So you're taking Fine Arts."

Translation:

If **you take Fine Arts**, then **you can't stay in the Honor Society**.

You're not staying in the Honor Society.

You're taking Fine Arts.