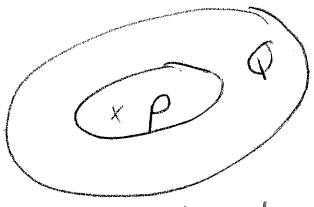
## Rules of Logic:

### Direct Argument: Law of Detachment

Premise 1: **p → q** **(if p, then q)** T
Premise 2: **p** **(p is true)** T
Therefore ∴ **q** **(therefore q is true)** T

conditional




*Example*:

Premise 1: If Max has been to Ocean City, then he has been to Maryland.
Premise 2: Max has been to Ocean City.

Conclusion: ∴ Max has been to Maryland

| P | q | p → q |
|---|---|---|
| * T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

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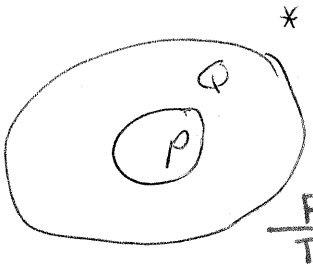
### Indirect Argument (Law of Contrapostive Inference):

Premise 1: **p → q** **(if p, then q)** T
Premise 2: **~q** **(q is not true)** F
Therefore ∴ **~p** **(therefore p is not true)** F

contrapositive




*Example*:

Premise 1: If a figure is a square, then it is a parallelogram.
Premise 2: A figure is not a parallelogram.

Conclusion: ∴ The figure is not a square

| P | q | p → q |
|---|---|---|
| T | T | T |
| T | F | F |
| F | T | T |
| * F | F | T |

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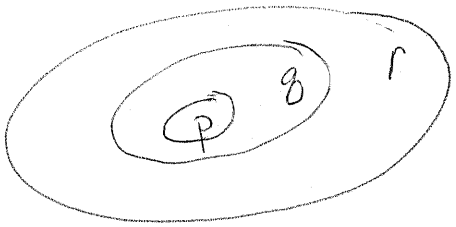
### Chain Rule: Law of Syllogism

Premise 1: **p → q** **(if p, then q)**
Premise 2: **q → r** **(if q, then r)**
Therefore ∴ **p → r** **(therefore if p, then r)**




*Example*:

Premise 1: If a polygon is a square, then it is a rectangle.
Premise 2: If a polygon is a rectangle, then it is a parallelogram.

Conclusion: ∴ If a polygon is a square, then it is a parallelogram

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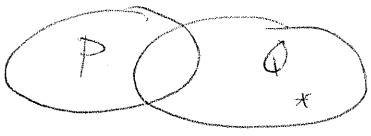
### Or Rule:

Premise 1: **p or q**
Premise 2: **~p** **(p is not true)**
Therefore **q** **(therefore q is true)**




*Example*:

Premise 1: Bill is in the living room or in the kitchen.
Premise 2: Bill is not in the kitchen.
Conclusion: ∴ Bill is in the living room.

**Practice**:

**What conclusion can be drawn when both premises are true? What's your reasoning?**

*Premise* 1: If an animal is an insect, then it has exactly six legs. P Q
*Premise* 2: A spider does not have six legs. ~Q
*Conclusion*: A spider is not an insect ~P

Indirect Argument (Law of Contrapositive Inference)

*Premise* 1: If a plant is a flower, then its color is white. P Q
*Premise* 2: A rose is a flower. P
*Conclusion*: A rose is white Q

Direct Argument Law of Detachment

*Premise* 1: Figure ABCD is a trapezoid or figure ABCD is a parallelogram. P Q
*Premise* 2: Figure ABCD is not a trapezoid. ~P
*Conclusion*: ABCD is a parallelogram Q

OR Rule

*Premise* 1: If I take the number 10 bus, then I can get to the mall. P Q
*Premise* 2: If I can get to the mall, then I can go to the movies.
*Conclusion*: If I take the #10 bus, then I can go to the movies

Chain Rule

*Premise* 1: If you pass the test, then you will pass the final. P Q
*Premise* 2: You do not pass the final. ~Q
*Conclusion*: You did not pass the test ~P

Indirect Argument Law of Contrapositive Inference

*Premise* 1: If Tom lives in Pittsburgh, then he lives in Pennsylvania. P Q
*Premise* 2: If Tom lives in Pennsylvania, then he lives in the United States.
*Conclusion*: If Tom lives in Pittsburgh then he lives in the U.S. Q R

Chain Rule

*Premise* 1: If $2x - 3 = 18$, then $2x = 21$. P Q
*Premise* 2: $2x \neq 21$. ~Q
Conclusion: $2x - 3 \neq 18$ ~P

Indirect argument Law of Contrapositive Inference