2 - 4
Deductive Reasoning

deductive reasoning: uses facts, rules, definitions, or properties to reach a conclusion

Law of Detachment

* If $p \rightarrow q$ is true and p is true, then q is also true.

If an "if-then" statement is true and the **hypothesis** is true, then
the conclusion is true.

If an "if-then" statement is true and the **conclusion** is true, then

we can't determine if hypothesis is true.

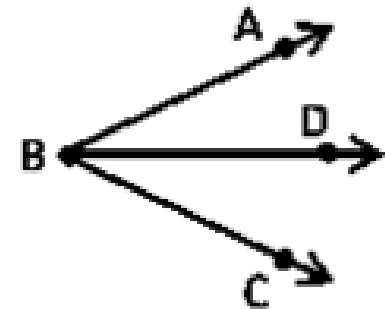| p	q	$p \rightarrow q$
T	(T)	T
T	F	F
F	(T)	T
F	F	T

The following is a true conditional. Determine whether the conclusion is valid based on the given information.

"If a ray is an angle bisector, then it divides the angle into two congruent angles."

Given: $\overrightarrow{BD}$ bisects $\angle ABC$

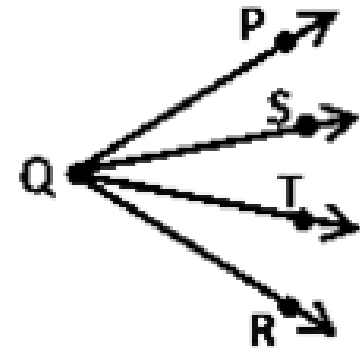Conclusion: $\angle ABD \cong \angle CBD$

valid

The following is a true conditional. Determine whether the conclusion is valid based on the given information.

"If a ray is an angle bisector, then it divides the ==angle into two congruent angles=="

Given: ==∠PQT ≅ ∠RQS==

Conclusion: $\overrightarrow{QS}$ and $\overrightarrow{QT}$ are angle bisectors

invalid

Law of Syllogism

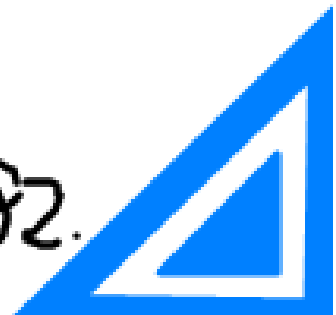∗ If $p \rightarrow q$ and $q \rightarrow r$ are both true, then $p \rightarrow r$ is also true.

Use the Law of Syllogism to determine whether a valid conclusion can be reached from each set of statements.

#1: *If the symbol of a substance is Pb, then it is lead.*
  $$P \qquad q$$

#2: *The atomic number of lead is 82.*
  $$q \qquad r$$

$$P \rightarrow q$$

(Yes)

$$q \rightarrow r$$

$$P \rightarrow r \;:\; \text{If the symbol of a}$$
substance is Pb, then its atomic number is 82.

Use the Law of Syllogism to determine whether a valid conclustion can be reached from each set of statements.

#1: Water can be represented by H_2O.
#2: Hydrogen and oxygen are in the atmosphere.

no valid conclusion

(C of one is _not_ H of other)

Determine whether statement (3) follows from statements (1) and (2) by either law. If it does, state which law was used. If not, write "invalid".

(1) Vertical angles are congruent.
p q

(2) If two angles are congruent, then their measures are equal.
q r

(3) If two angles are vertical, then their measures are equal.

Valid, Law of Syllogism

Determine whether statement (3) follows from statements (1) and (2) by either law. If it does, state which law was used. If not, write "invalid".

(1) If a figure is a square, then it is a polygon.
$\overset{H}{}$ $\overset{C}{}$

(2) Figure A is a polygon. (C)

~~(3) Figure A is a square.~~

invalid

Homework:

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