

HW #1

- Read syllabus, add Khan Academy coach code, and fill out survey
- Read Ch 1.
Note that you are responsible for knowing all definitions, theorems, and formulas in your text, even if not explicitly gone over in class.
Key words are highlighted in your textbook in red.

HW #2

- Ch 1 Review Problems pp. 36-38 - all problems from sets I, II, & III
Due Friday. Show all of your own work!

HW #3

- Ch 2 Review pp.71-74 #1-50. Due early next week.

2.1 #7-11

“If it is snowing, then it is cold outside.”

“If it is cold outside, then it is snowing.”

7. Do both statements have the same hypothesis? **no**

8. Are they both true? Why or why not?

no. top is true, not necessarily snowing if it's cold

9. Do they mean the same thing? **no**

10. Rewrite the first statement so that the conclusion is stated before the hypothesis.

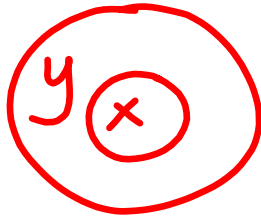
It is cold outside if it is snowing.

11. Is the statement that you wrote true?

yes

27. Draw Euler diagrams to represent the statements.

“If x, then y.”



“If y, then x.”



*contrapositives
(logically
equivalent)*

29. Which diagram also illustrates the statement “If not y, then not x”?

2.2 – Definitions

When we define a word in mathematics, the word and its definition are understood to have the exact same meaning.

For example, if we define a “triangle” as “a polygon that has three sides,” then both of the following statements are true:

“If a figure is a triangle, then it is a polygon that has three sides.”

“If a figure is a polygon that has three sides, then it is a triangle.”

For statement “If a, then b.”

*$a \rightarrow b$ “a implies b”
 $b \rightarrow a$ “b implies a”*

Its converse is “If b, then a.”

In general, if a statement is true, then its converse is not necessarily true.

If a statement is a definition, then its converse is always true, and the two statements can be combined into an “if and only if” statement.

“A figure is a triangle if and only if it is a polygon that has three sides.”

True statement: If you are an astronaut, you are not more than six feet tall.

Hypothesis: *you are an astronaut*

Conclusion: *you are not more than six feet tall*

6. Write the converse of the statement.

If you are not more than six feet tall, then you are an astronaut.

7. Is the converse true?

no

8. Does it have the same meaning as the original statement?

no

Definition: You have arachibutyrophobia iff you have the fear of peanutbutter sticking to the roof of your mouth.

if and only if

If the definition were represented in symbols as $a \leftrightarrow b$ and "a" represents "arachibutyrophobia," what does

14. \leftrightarrow represent? *if and only if*

15. "b" represent?

fear of peanut butter sticking to roof of your mouth

In words, " $a \rightarrow b$ " for this definition is "If you have arachibutyrophobia, then you are afraid of peanut butter sticking to the roof of your mouth."

16. Write in words, " $b \rightarrow a$ " for this definition.

If you are afraid of pb. on roof of your mouth, then you have arachibutyrophobia.

17. Is this sentence necessarily true?

yes

(1) If it is your birthday, then you get some presents.

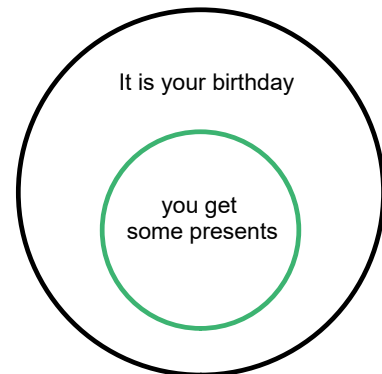
(2) Only if it is your birthday, do you get some presents.

24. Is the first sentence true for you?

25. Is the second sentence true for you?

27. Which sentence does this Euler Diagram illustrate?

#2



2.3 – Direct Proof

A syllogism is an argument of the form

$a \rightarrow b$
 $b \rightarrow c$

Therefore, $a \rightarrow c$.

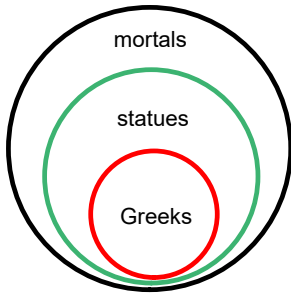
A syllogism is an example of a direct proof.

The statements $a \rightarrow b$ and $b \rightarrow c$ are called the premises of the argument.

$a \rightarrow c$ is called the conclusion of the argument, and is often considered to be a theorem.

A theorem is a statement that is proved by reasoning deductively from already accepted statements.

Syllogisms were discussed by the Greek philosopher Aristotle in the fourth century BC. Write the syllogism illustrated by the following Euler diagram.



If one is Greek, then one is a statue.
 If one is a statue, then one is mortal.
 Therefore,
 if one is Greek, then one is mortal.

6. If the premises of a syllogism are true, does it follow that its conclusion must be true?

yes.

7. If the premises of a syllogism are false, does it follow that its conclusion must be false?

not necessarily

“Admit one ridiculous premise and the rest follows.” – Aristotle

If <u>you live at the South Pole</u> , <u>you live in the Antarctic</u> . (1)	$a \rightarrow b$
If <u>you live in the Antarctic</u> , <u>you live where it is cold</u> . (2)	$b \rightarrow c$
If <u>you live where it is cold</u> , <u>you see a lot of penguins</u> . (3)	$c \rightarrow d$
Therefore, if <u>you live at the South Pole</u> , <u>you see a lot of penguins</u> .	$a \rightarrow d$

What part of the second premise matches

8. the conclusion of the first premise? hypothesis

9. the hypothesis of the third premise? conclusion

10. Starting with $a \rightarrow b$ to represent the first premise, represent the entire argument in symbols.

11. Which premise is ridiculous (false)? (3)

12. What does the fact that one premise is false indicate about the conclusion of the argument?

we cannot assume that it is either true or false

If Captain Spaulding is in the jungle, there are too many cheetahs.

If there are too many cheetahs, Captain Spaulding can't play cards.

13. What conclusion follows from these premises?

If Captain Spaulding is in the jungle,
then he can't play cards.

14. If the two premises are true, does it follow that the conclusion must be true?

yes