Section 2.3

An argument is a sequence of statements.
The last statement is called the conclusion.
All the preceding statements are called the assumptions or hypotheses or premises.
(The conclusion usually starts with "Therefore" or "So".)

An argument is valid if and only if
the conclusion is true in all cases where the assumptions are true.
So, an argument is invalid if and only if
there is a situation in which the assumptions are true, but the conclusion is false.

> **The validity of an argument is NOT simply determined by
> whether the assumptions and conclusion are true or false statements by themselves.**

To determine if an argument is valid or invalid,
construct a truth table with columns for each assumption and the conclusion.
Highlight all rows in which all assumptions are true. (These are called the critical rows.)
If the conclusion is true in all those rows, the argument is valid.

NOTE: An argument can be valid without its assumptions actually being true statements,
          because in determining if an argument is valid,
          you must accept that all its assumptions are true.
          If an argument is valid, and all its assumptions are actually true statements,
          then we say the argument is sound.

ARGUMENT #0

If today is Thursday, then Math 22 meets today.

Math 22 meets today.

Therefore, today is Thursday.

ARGUMENT #1

If today is Thursday, then Math 22 meets today.

Today is Thursday.

Therefore, _____.

ARGUMENT #2

If you study hard, then you will do well.

You didn't do well.

Therefore, _____.

ARGUMENT #3

Today is Thursday.

Therefore, _____ or this is Math 43.

ARGUMENT #4

Today is Thursday and this is Math 22.

Therefore, _____.

ARGUMENT #5

Today is Thursday.

This is Math 22.

Therefore, _____.

ARGUMENT #6

Today is Thursday or this is Math 43.

This is not Math 43.

Therefore, _____.

ARGUMENT #7

If today is Thursday, then Math 22 meets today.

If Math 22 meets today, then I cannot sleep in until 2pm.

Therefore, _____.

ARGUMENT #8

Today is Tuesday or today is Thursday.

If today is Tuesday, then Math 22 meets today.

If today is Thursday, then Math 22 meets today.

Therefore, _____.

ARGUMENT #9

If you eat your veggies, then you will get a dessert.

You do not eat your veggies.

Therefore, you will not get a dessert.

ARGUMENT #10

If today is Sunday, then the moon is made of cheese.

Today is Sunday.

Therefore, _____.

Someone killed Mr Body using a weapon. Assuming all the following statements are true, can you determine who the killer was and what weapon they used ?

If Miss Plum did not use the gun, then Mrs Red did not use the knife and Ms Scarlet did not use the wrench.

Either Mr Violet did not use the hammer or Mr Yellow used the poison.

If Mr White did not use the candlestick, then Ms Scarlet used the wrench.

If Mr Violet did not use the hammer, then Miss Plum did not use the gun.

Mr Yellow did not use the poison.

NOTE:

The argument

Statement 1

Statement 2

Statement 3 …

Statement n

Conclusion

is valid if and only if the compound statement

(Statement 1 $\wedge$ Statement 2 $\wedge$ Statement 3 $\wedge$ … $\wedge$ Statement n) $\rightarrow$ Conclusion

is a _____ .