1. What four elements are found in any deductive structure?

1. Undefined Terms
2. Postulates
3. Definitions
4. Theorems

2. Which of the following kinds of statements are always reversible?

a. Definitions
b. Theorems Only definitions are always reversible!!
c. Postulates

3. Answer each question Yes or No.

a. Do we prove theorems? Yes!
b. Do we prove definitions? No!

4. Tell whether each of the following statements is a theorem or a definition.

a. If two angles are right angles, then they are congruent. Theorem
b. If a ray bisects an angle, it divides the angle into two congruent angles. Definition
5.

a. Write the converse of each of the following statements:

   i. If A, then B
   
   Converse: If B, then A

   ii. Rain ⇒ Wet
   
   Converse: Wet ⇒ Rain

   iii. If an angle is a 45° angle, then it is acute.
   
   Converse: If an angle is acute, then it is a 45° angle.

   iv. If a point is the midpoint of a segment, it divides the segment into two congruent segments.
   
   Converse: If a point divides a segment into two congruent segments, then it is the midpoint of the segment.

b. Is each converse true, false, or potentially both true and false? Hint: if it can be false in one situation, it is considered a false statement.

   i. May be either true or false

   ii. False

   iii. False

   iv. True

8.

State whether or not the conclusion is deducible. If it is not, comment on the error in the reasoning:

If a student at Niles High has room 303 as his or her homeroom, the student is a freshman. Joe Jacobs is a student at Niles High and has room 303 as his homeroom. Therefore, Joe Jacobs is a freshman.

   This conclusion is deducible.
9. State whether or not the conclusion is deducible. If it is not, comment on the error in the reasoning:

If the three angles of a triangle are acute, then the triangle is acute. In \( \triangle ABC \), \( \angle A \) and \( \angle B \) are acute. Therefore, \( \triangle ABC \) is acute.

This is not deducible since we don't know the measure of \( \angle C \).

![Triangle Diagram]

10. State whether or not the conclusion is deducible. If it is not, comment on the error in the reasoning:

All school buses stop at railroad crossings. A vehicle stopped at the Santa Fe railroad crossing. Therefore, that vehicle is a school bus.

This is not deducible since we not all vehicles stopping at the railroad crossing need be busses! This is called reasoning from the converse.

11. State whether or not the conclusion is deducible. If it is not, comment on the error in the reasoning:

All cloudy days are depressing. Therefore, since I was depressed on Thursday, Thursday was cloudy.

This is not deducible since we don't know that the only days on which the person is depressed are cloudy ones. He/she could also be depressed on sunny days. Again, we are falsely reasoning from the converse.
12. 
State whether or not the conclusion is deducible. If it is not, comment on the error in the reasoning:

If two angles of a triangle are congruent, then the sides opposite them are congruent. In \( \triangle ABC \), \( \angle A = \angle B \). Therefore in \( \triangle ABC \), \( BC = AC \).

This conclusion is deducible.

14. 
The zoo has a green lizard, a red crocodile, and a purple monkey. All we know about them is the following. Match their names to the type of animal.

1. Wendy cannot get along with the lizard.
2. Katie playfully took a bite out of the monkey's ear one month ago.
3. Wendy never casts a red reflection in the mirror.
4. Jody has the personality of a crocodile, but she isn't one.