Geometry Practice: Deductive Reasoning, SOL G.1

Determine if statement (3) follows from statements (1) and (2) by either the Law of Detachment or the Law of Syllogism. If it does, state which law was used. If it does not, write invalid.

1. (1) If an angle measures more than 90°, then it is not acute.
   (2) \( m\angle ABC = 120° \)
   (3) \( \angle ABC \) is not acute.

2. (1) All 45° angles are congruent.
   (2) \( \angle A \cong \angle B \)
   (3) \( \angle A \) and \( \angle B \) are 45° angles.

3. (1) If you eat too much turkey, then you will get sick.
   (2) Kinsley got sick.
   (3) Kinsley ate too much turkey.

4. (1) If you wear the school colors, then you have school spirit.
   (2) If you have school spirit, then the team feels great.
   (3) If you wear the school colors, then the team will feel great.

Decide whether inductive or deductive reasoning is used to reach the conclusion. Explain your reasoning.

5. Angela knows that Walt is taller than Peter. She also knows that Peter is taller than Natalie. Angela reasons that Walt is taller than Natalie.

6. Josh knows that Brand X computers cost less than Brand Y computers. All other brands that Josh knows of cost less than Brand X. Josh reasons that Brand Y costs more than all other brands.

7. For the past three Wednesdays, the cafeteria has served macaroni and cheese for lunch. Dana concludes that the cafeteria will serve macaroni and cheese for lunch this Wednesday.

State whether the argument is valid. Explain.

8. Katie knows that all sophomores take driver education in her school. Brandon takes driver education. So Brandon is a sophomore.
Use the true statements below to determine whether you know the conclusions is true or false. Explain your reasoning.

If Dan goes shopping, then he will buy a pretzel.
If the mall is open, then Jodi and Dan will go shopping.
If Jodi goes shopping, then she will buy a pizza.
The mall is open.

9. Dan bought a pizza.  
10. Jodi had some of Dan’s pretzel.
11. Jodi and Dan went shopping.  
12. Jodi bought a pizza.

13. REASONING What can you say about the sum of an even integer and an even integer? Use inductive reasoning to form a conjecture. Then use deductive reasoning to show that the conjecture is true.

14. Let p: you see lightning and q: you hear thunder. Write each of the following in symbolic form:
   a) If you see lightning, then you hear thunder.
   b) If you hear thunder, then you see lightning.
   c) If you don’t see lightning, then you don’t hear thunder.
   d) If you don’t hear thunder, then you don’t see lightning.

15. Let p: two planes intersect and q: the intersection is a line. Write each of the following in “If.....Then” form:
   a) p → q
   b) ~p → q
   c) q → p
   d) ~q → p
   e) ~p → ~q
   f) ~q → ~p
   g) p → ~q
   h) q → ~p