<u>DIRECTIONS</u>: Rewrite each pair of conditionals as a **biconditional**. The phrase
 "if and only if" should appear in your answers.

1. If B is between A and C, then $AB + BC = AC$.
If $AB + BC = AC$, then B is between A and C.
B is between A and C **if and only if** $AB + BC = AC$.   OR
$AB + BC = AC$ **if and only if** B is between A and C.

2. If today is the 4th Thursday of November, then it is Thanksgiving in the United States.
If today is Thanksgiving in the United States, then it is the 4th Thursday in November.
Today is the 4th Thursday of November **if and only if** it is Thanksgiving in the United States.   OR
It is Thanksgiving in the United States **if and only if** today is the 4th Thursday of November.

3. If $0 < m\sphericalangle XYZ < 90$, then $\sphericalangle XYZ$ is an acute angle.
If $\sphericalangle XYZ$ is an acute angle, then $0 < m\sphericalangle XYZ < 90$.
$0 < m\sphericalangle XYZ < 90$ **if and only if** $\sphericalangle XYZ$ is an acute angle.   OR
$\sphericalangle XYZ$ is an acute angle **if and only if** $0 < m\sphericalangle XYZ < 90$.

4. If points are collinear, then they all lie in one line.
If points all lie in one line, then they are collinear.
Points are collinear **if and only if** they all lie in one line.   OR
Points all lie in one line **if and only if** they are collinear.

5. If you are in Algeria, then you are in the largest country (by area) in Africa.
If you are in the largest country (by area) in Africa, then you are in Algeria.
You are in Algeria **if and only if** you are in the largest country (by area) in Africa.   OR
You are in the largest country (by area) in Africa **if and only if** you are in Algeria.

6. If all three sides of a triangle have equal lengths, then the triangle is equilateral.
If a triangle is equilateral, then all three sides of the triangle have equal lengths.
All three sides of a triangle have equal lengths **if and only if** the triangle is equilateral.   OR
A triangle is equilateral **if and only** if all three sides of have equal lengths.

DIRECTIONS: Provide a **counterexample** to show each statement is false. You may use words or a diagram.

7. If a number is divisible by 5, it is divisible by 10.

8. If a 4-sided figure has 4 right angles, then it has 4 congruent sides.

9. If a 4-sided figure has 4 congruent sides, then it has 4 right angles.

10. If $\overline{CD} \cong \overline{DE}$, then D is the midpoint of $\overline{CE}$.

11. If point G is on ray $\overrightarrow{AB}$, then G is on ray $\overrightarrow{BA}$.

12. If $ab < 0$, then $a < 0$.

DIRECTIONS: Write each biconditional as **two conditionals** that are **converses** of each other.

13. An angle is a right angle if and only if its measure is 90.

   If an angle is a right angle **then** its measure is 90.

   If an angle has a measure of 90 **then** it is a right angle.

14. Tomorrow is Thursday if and only if today is Wednesday.

   If tomorrow is Thursday, **then** today is Wednesday.

   If today is Wednesday, **then** tomorrow is Thursday.