Write each sentence in conditional ("If . . ., then . . .") form.

- a. Eighteen-year-olds may vote in federal elections.
- b. Opposite angles of a parallelogram are congruent.

2.

Write the converse, the inverse, and the contrapositive of each statement. Determine the truth of each of the new statements.

a. If each side of a triangle has a length of 10, then the triangle's perimeter is 30.

Converse:

Inverse:

Contra:

b. If an angle is acute, then it has a measure greater than 0 and less than 90.

Converse:

Inverse:

Contra:

If a conditional statement and its converse are both true, the statement is said to be *biconditional*. Which of these statements is biconditional?

a. If two angles are congruent, then they have the same measure.

b. If two angles are straight angles, then they are congruent.

4.

Draw a Venn diagram for the true conditional statement "if a person lives in Chicago, then the person lives in Illinois." Assuming that each of the following "Given . . ." statements is true, determine the truth of the conclusion.

- a. Given: Penny lives in Chicago. Conclusion: Penny lives in Illinois.
- b. Given: Benny lives in Illinois. Conclusion: Benny lives in Chicago.
- c. Given: Kenny does not live in Chicago. Conclusion: Kenny must live in Illinois.
- d. Given: Denny does not live in Illinois. Conclusion: Denny lives in Chicago.

Write a concluding statement for each of the following chains of reasoning.

- a. $a \Rightarrow b$ $d \Rightarrow -c$ $-c \Rightarrow a$ $b \Rightarrow f$ b. $p \Rightarrow -q$
 - r⇒q

 - s ⇒ r
- C. If weasels walk wisely, the cougars call their cubs.
 If goats go to graze, then horses head for home.
 If cougars call their cubs, then goats go to graze.
 If bobcats begin to browse, then weasels walk wisely.

6.

Write the converse, the inverse, and the contrapositive of the following statement. Determine the truth of each of the new statements.

If M is the midpoint of \overline{AB} , then M, A, and B are collinear.

Converse:

Inverse:

Contra:

7.

Rewrite the following sentence in conditional form and find its converse, inverse, and contrapositive: "A square is a quadrilateral with four congruent sides."

If a polygon is a square, then it is a quadrilateral with four congruent sides.

Converse:

Inverse:

Contra:

What conclusion can be drawn from the following?

 $-c \Rightarrow -f$ $g \Rightarrow b$ $p \Rightarrow f$ $c \Rightarrow -b$