

2.) (16 pts total, 4 pts each) (2.2 Biconditionals and Definitions) Each conditional statement is true. Write and consider the converse. If the converse is true, combine the statements and write them as a biconditional.

a) If you are a fan of the Boston Red Sox, then you are a fan of the 2018 World Series Champions.

Converse: If you are a fan of the 2018 World Series Champions, then you are a fan of the Boston Red Sox (true) if, and only if, you are a fan of the 2018 World Series Champions if, and only if, you are a fan of the Boston Red Sox

b) If you are friends with Nate, then you are accustomed to disappointment.

Elon Musk

PERSON

c) If you are ~~Jeff Bezos~~, then you are the richest ~~man~~ in the world.

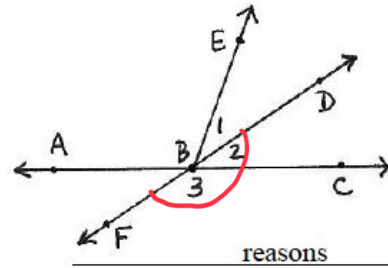
d) If you own a raccoon, then you have made a poor decision.

6.) (36 pts total, 9 pts each) (2.5 Proving Angles Congruent) Complete the following proofs.

a)

VII. Given:  $\overline{BD}$  bisects  $\angle EBC$   
 Prove:  $\angle 1$  and  $\angle 3$  are supplementary

\_\_\_\_\_ statements \_\_\_\_\_

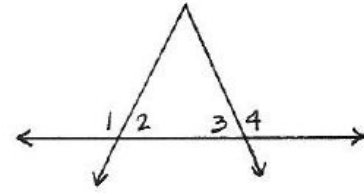


1.  $\overline{BD}$  bisects  $\angle EBC$
2.  $\angle 1 \cong \angle 2$
3.  $\angle 2$  and  $\angle 3$  form a linear pair
4.  $m\angle 2 + m\angle 3 = 180$
5.  $m\angle 1 = m\angle 2$
6.  $m\angle 1 + m\angle 3 = 180$
7.  $\angle 1$  and  $\angle 3$  are supplementary

1. Given
2. Definition of bisector
3. Definition of linear pair
4. Definition of linear pair
5. Definition of congruency
6. Substitution
7. Definition of supplementary angles

b)

IX. Given  $\angle 2 \cong \angle 3$   
 Prove:  $\angle 1 \cong \angle 4$



statements

reasons

1.  $\angle 1$  and  $\angle 2$  form a linear pair  
 $\angle 3$  and  $\angle 4$  form a linear pair
2.  $\angle 1$  and  $\angle 2$  are supp.  
 $\angle 4$  and  $\angle 3$  are supp.
3.  $\angle 2 \cong \angle 3$
4.  $\angle 1 \cong \angle 4$

1. Definition of linear pair
2. Definition of supplemental angles
3. Given
4. substitution or syllogism/transitive

$\angle 1 + \angle 2 = 180$   
 $\angle 3 + \angle 4 = 180$   
 $\angle 2 + \angle 4 = 180^\circ$   
 $\angle 1 + \angle 2 = \angle 2 + \angle 4$   
 $- \angle 2 \quad - \angle 2$   
 $\angle 1 = \angle 4$

c)

Given:  $\overline{FR} \cong \overline{AN}$   
 Prove:  $\overline{FA} \cong \overline{RN}$



Statement

Reason

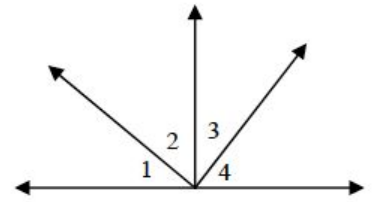
d)

**Given:**  $\angle 1$  and  $\angle 2$  are complementary.

$\angle 1 \cong \angle 3$

$\angle 2 \cong \angle 4$

**→ Prove:**  $\angle 3$  and  $\angle 4$  are complementary.



Statement

Reason

$\angle 1$  and  $\angle 2$  are complementary

Given

$$\angle 1 + \angle 2 = 90^\circ$$

Def of complementary

$$\begin{array}{l} \angle 1 \cong \angle 3 \\ \angle 2 \cong \angle 4 \end{array} \quad \left. \vphantom{\begin{array}{l} \angle 1 \cong \angle 3 \\ \angle 2 \cong \angle 4 \end{array}} \right\}$$

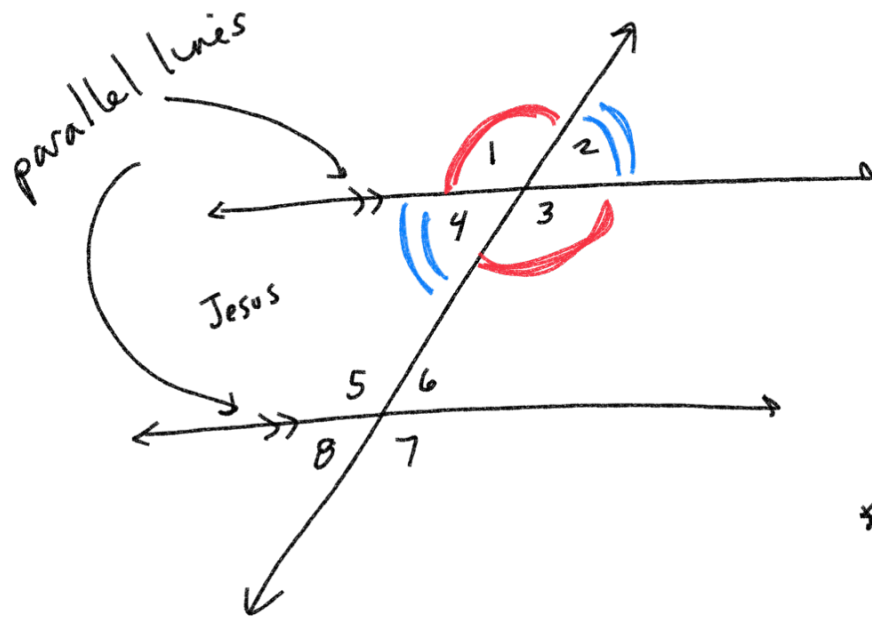
Given

$$\angle 3 + \angle 4 = 90^\circ$$

Substitution

$\angle 3$  and  $\angle 4$  are complementary

Def of complementary



$\angle 1 + \angle 2 = 180^\circ$  supplemental

Linear pairs  
(adjacent and form a line)

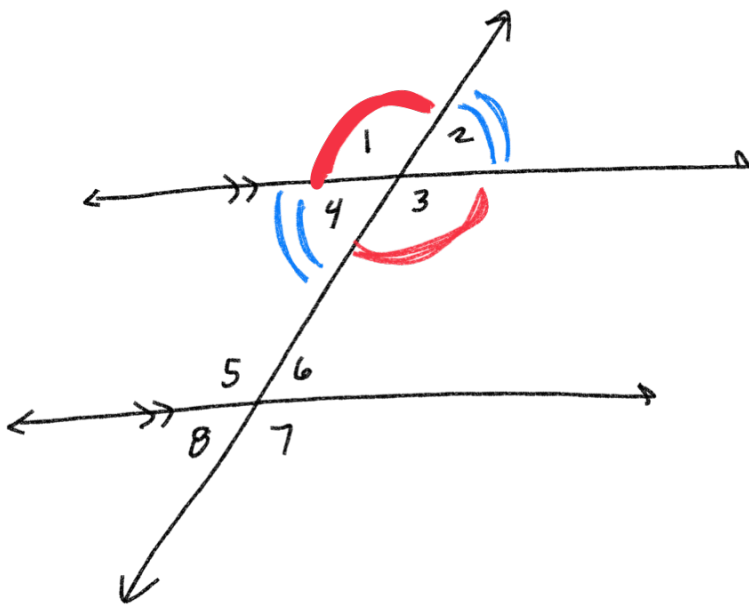
$\angle 2 + \angle 3 = 180^\circ$  supplemental

Linear pairs

$\angle 1 + \angle 2 = \angle 2 + \angle 3$  substitute  
 $-\angle 2 \quad -\angle 2$  sub P&E

$\angle 1 = \angle 3$  vertical angles

$\angle 2 = \angle 4$  vertical angles

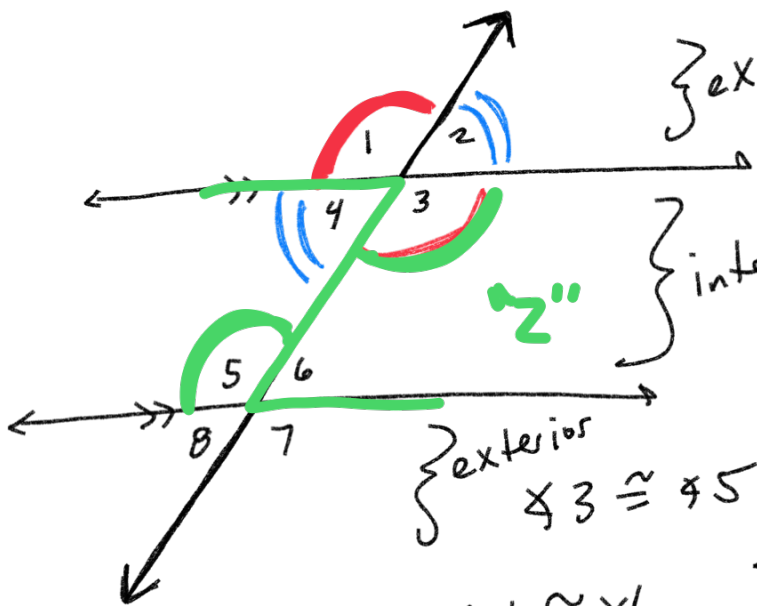


$\angle 1 \cong \angle 5$  corresponding angles

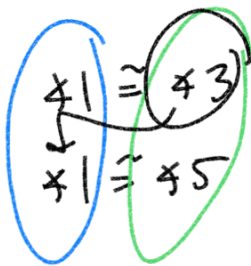
$\angle 2 \cong \angle 6$  corresponding

$\angle 3 \cong \angle 7$  corresponding

$\angle 4 \cong \angle 8$  corresponding



exterior



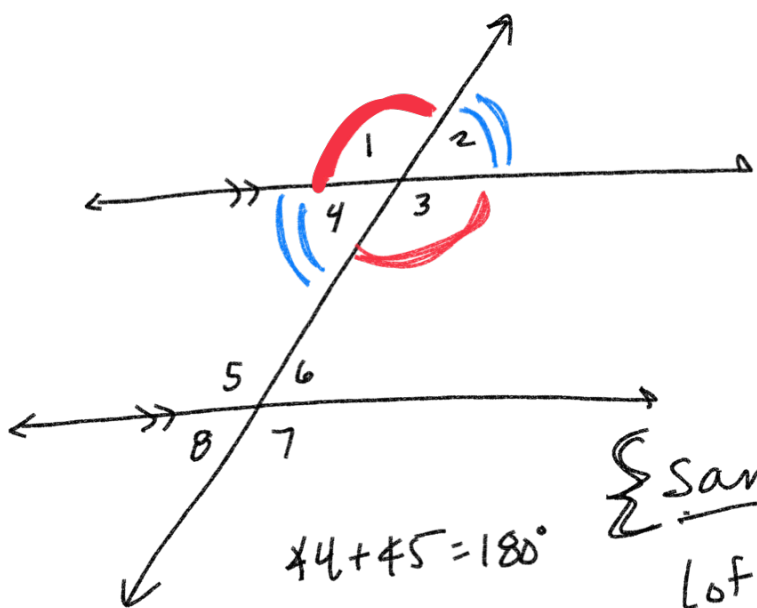
vertical corresponding

$\angle 3 = \angle 5$  substitution

interior  
 $\angle 3 \cong \angle 5$

Alternate (opposite sides of transversal) Interior Angle  
 space within parallel lines

$\angle 4 \cong \angle 6$



$\angle 4 \cong \angle 8$  corresponding angles

$\angle 5 + \angle 8 = 180^\circ$  linear

$\angle 5 + \angle 4 = 180^\circ$  substitution

$\angle 4 + \angle 5 = 180^\circ$   
 $\angle 3 + \angle 6 = 180^\circ$

Same side interior

(of transversal)

supplemental

inside parallel lines

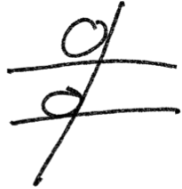
Not linear pairs

1.) Linear Pairs → two adjacent angles that form a line → supplementary  $180^\circ$

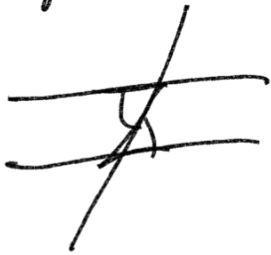
2.) Vertical Angles → opposite angles in intersecting lines → congruent



3.) Corresponding Angles → occupy the same space in a quadrant → congruent



4.) Alternate Interior Angles → opposite sides of transversal, in between parallel lines → congruent



5.) Same-side Interior Angles → same side of transversal, in between parallel lines → supplemental

