5.5a - Inequalities in one Triangle

1) Looking over assignments and Study Guide
2) Notes 5.5a : Angle-Side Relations
3) Notes 5.5b : Triangle Inequality Theorem
4) Assignment Time - different approach
5) Idea of Indirect Proof - more on Friday

Pg. 317 #3-7, 12-16, 21-27, 29-32, 34-37
Pg. 324 #11-27, 30-35
5.5a - Angle Side Relationships

**Theorem**
- If two sides of a triangle are not congruent, then the larger angle is opposite the longer side.

**Theorem**
- If two angles of a triangle are not congruent, then the longer side is opposite the larger angle.

"the bigger the angle, the bigger the opposite side"

**Example #1**: Write the angles in order from largest to smallest.

\[
\angle G\text{FH}, \angle GHF, \angle GFH
\]
Example #2: Write the sides in order from shortest to longest.

\[QP, QR, PR\]

5.5b - Side Inequalities

**Triangle Inequality Theorem**
The sum of two side lengths of a triangle is greater than the third side

\[a + b > c\]
\[a + c > b\]
\[b + c > a\]

**If three "possible" sides do not follow this rule, then it is not a "possible" triangle**
Example #3: Tell whether a triangle can have sides with the given lengths. Explain.

a) 7, 10, 19
   \(7 + 19 > 7\) yes
   \(19 + 7 > 10\) yes
   \(10 + 7 > 19\) no

b) 2.3, 3.1, 4.6
   yes
   \(2.3 + 3.1 > 4.6\) yes
   \(2.3 + 4.6 > 3.1\) yes
   \(4.6 + 3.1 > 2.3\) yes

c) \(n + 6, \ n^2 - 1, \ 3n\), when \(n = 4\)
   10  15  12

Example #4:

If the lengths of two sides of a triangle are 8 inches and 13 inches, find the range of possible lengths for the third side.

\[8 + \chi > 13\]
\[-8 -8\]
\[\chi > 5\]

\[\chi + 13 > 8\]
\[-13 -13\]
\[\chi < 21\]

\[13 + 8 > \chi\]
\[21 > \chi\]

\[5 \leq \chi \leq 21\]
Assignment (Due Friday, January 9)

1) Pg. 336 #18-21, 24, 27, 28, 32, 59, 61, 64
   -slightly different take on assignments

2) Quiz on 5.3 and 5.4 at start of Friday
   -medians, altitudes, and midsegments

3) Do you need your study guide checked??

5.5c - Indirect Proof

Idea of Indirect Proof

Show that the opposite cannot happen

a) assume the opposite of the conclusion is true
b) use direct reasoning to show that part a) leads to a contradiction
c) conclude since the assumption is false, that the original conjecture is true