2022-2023 James E Davis Trimester 1 Geometry Week 1 Class Notes
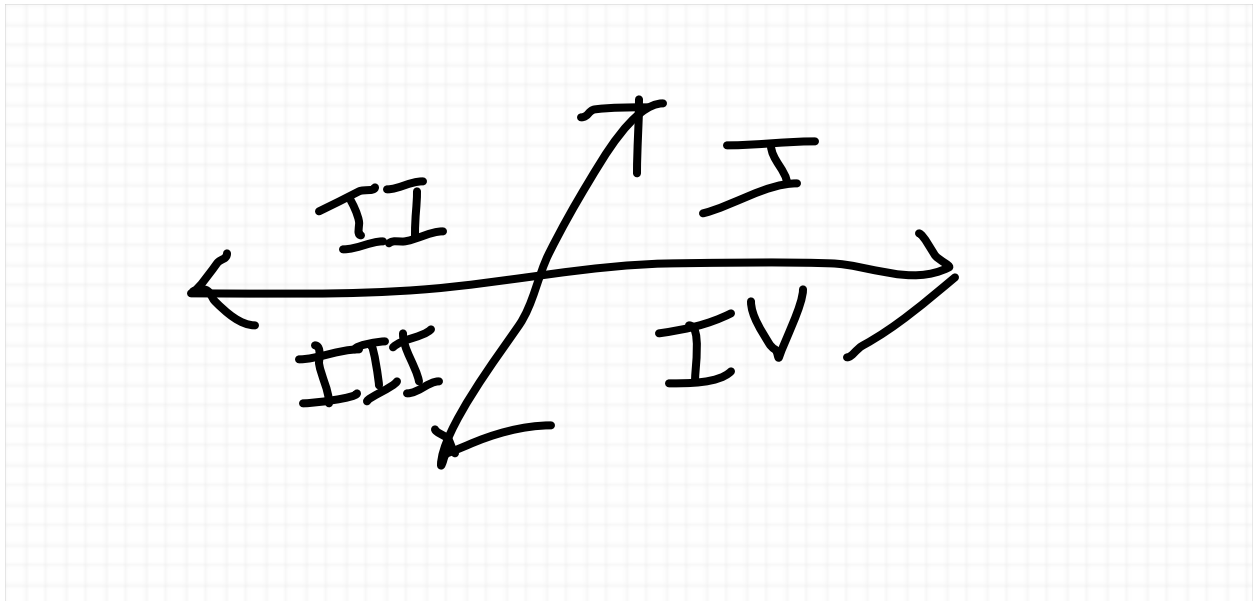
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Previously...

Already done during warm up.

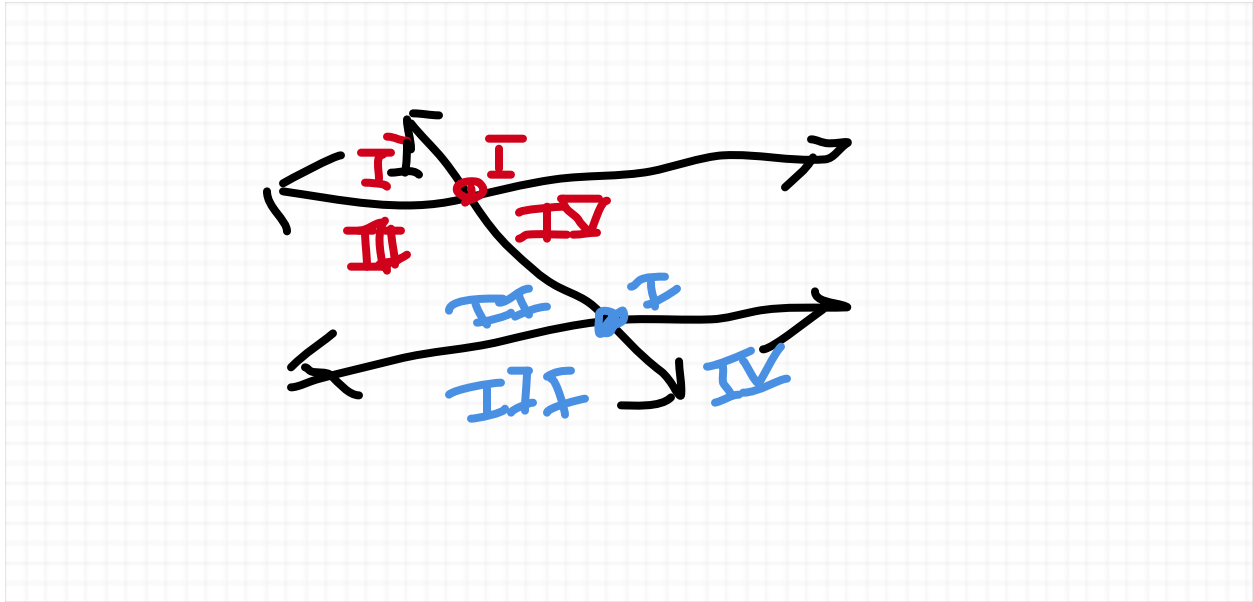## Transversal Lines and Their Angles

Remember for talking about transvesal lines and their angles the notion of quadrants

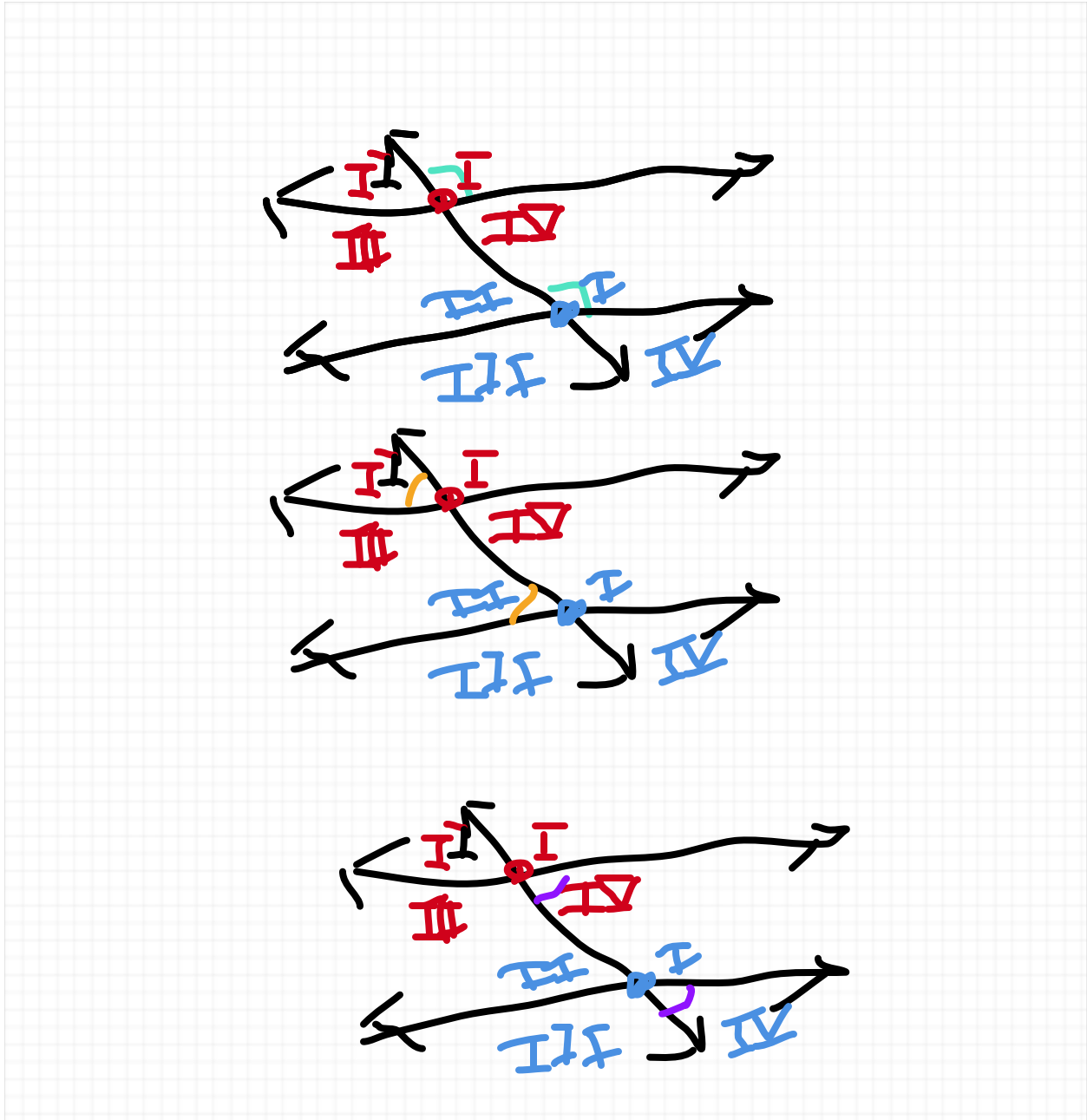For any intersecting line, we have angles in four quadrants (above)

For any transversal, we have at least two intersections and two groups of four angles (each divided into quadrants)

And for vocabulary that relates two angles such as "corresponding angles", "alternate interior angles", and so on, we can talk about those relations in terms of the quadrants

corresponding angles-angles share the same quadrant

The following angles drawn in the transversals below are examples of corrresponding angles
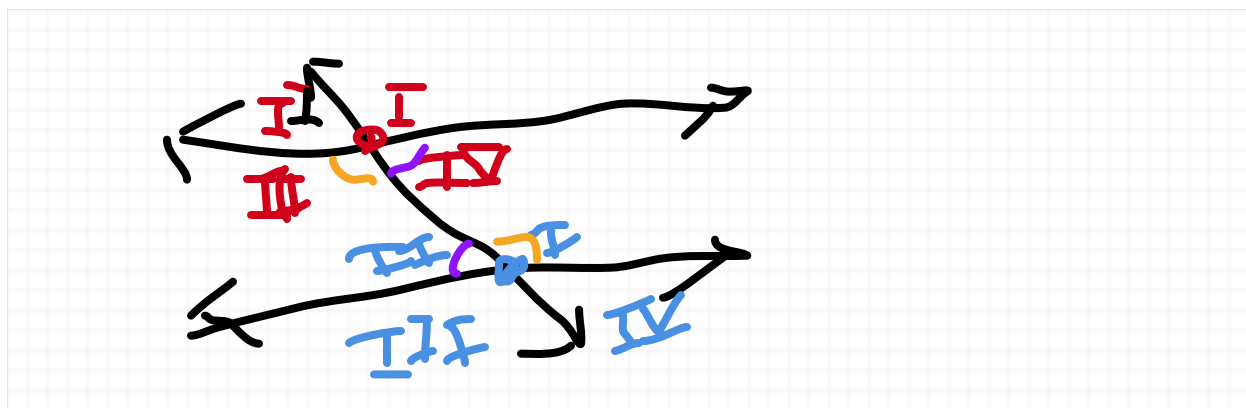
The **interior quadrants** are the quandrants that are inside of a transversal, i.e. on top, we have the third and fourth quadrands, and on the bottom, we have the first and second quadrants.
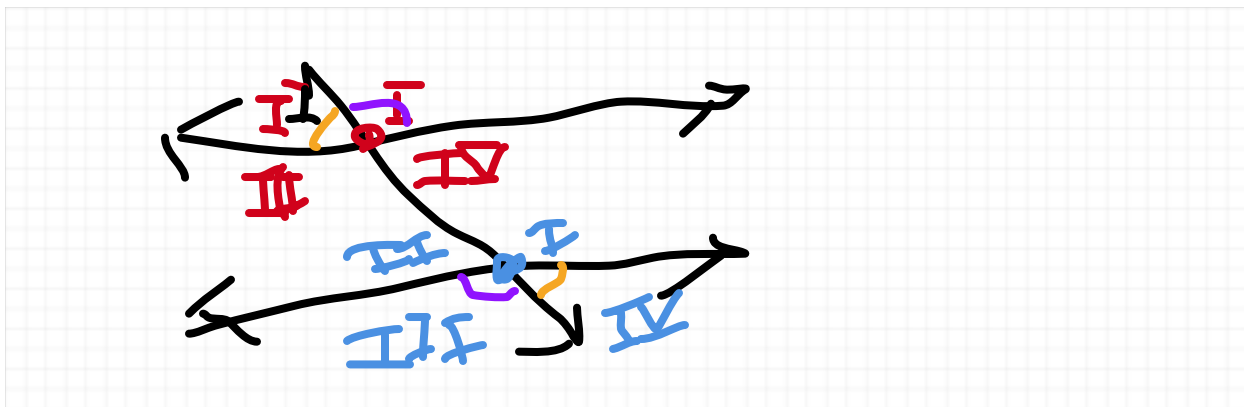
The **exterior quadrants** are the quadrants that are outside of a transversal, i.e., on top, we have the first and second quadrants, and on the bottom, we have the third and the fourth quadrants
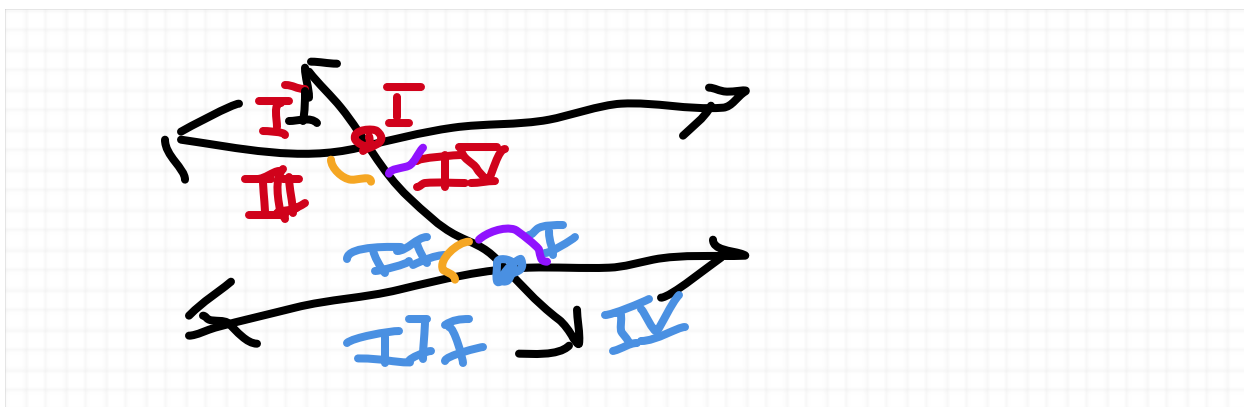
Interior quadrants

Exterior quadrants
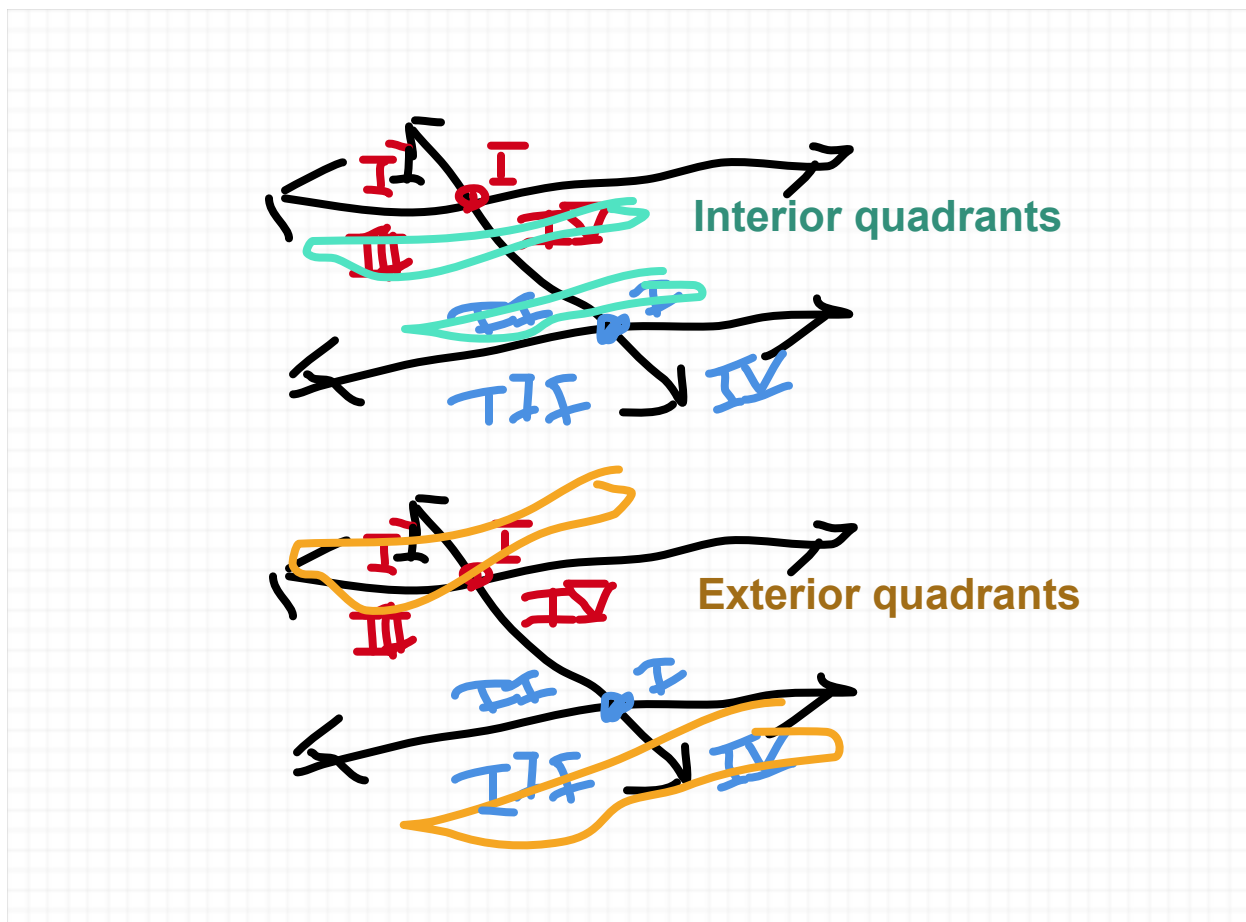
alternate interior angles are angles that are opposite sides/quadrant (relative to the transversing line) to each other in the interior quadrants.


alternate exterior angles are the angles that are on the opposite side of each other in the exterior quadrants.

consecutive interior angles are angles that are on the same side in the interior quadrants.

consecutive exterior angles (not discussed in the text, but worth discussing for completenesss) are angles that are on the same side in the exterior quandrants

Preview for Tomorrow

N/A
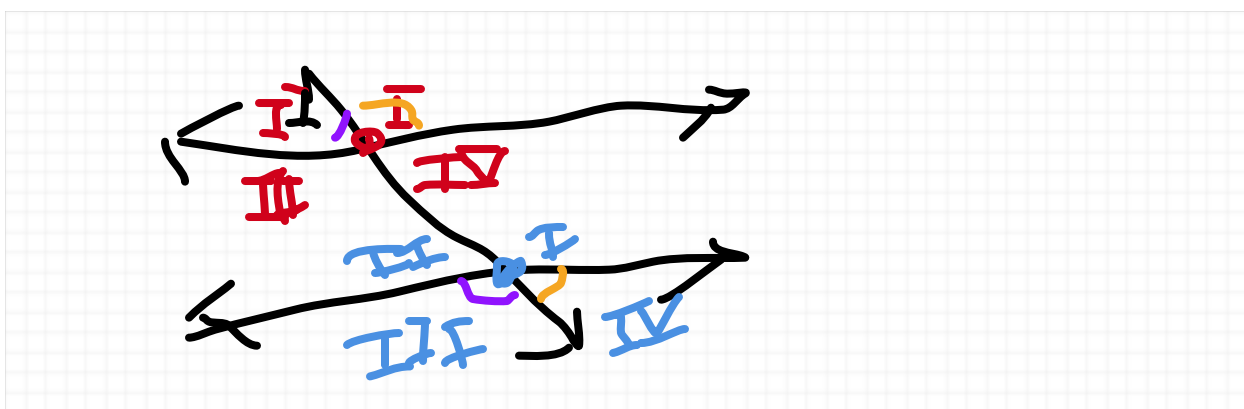
Previously...

Previously, we talked corresponding, alternate interior, alternate exterior, consecutive interior, consecutive exterior.
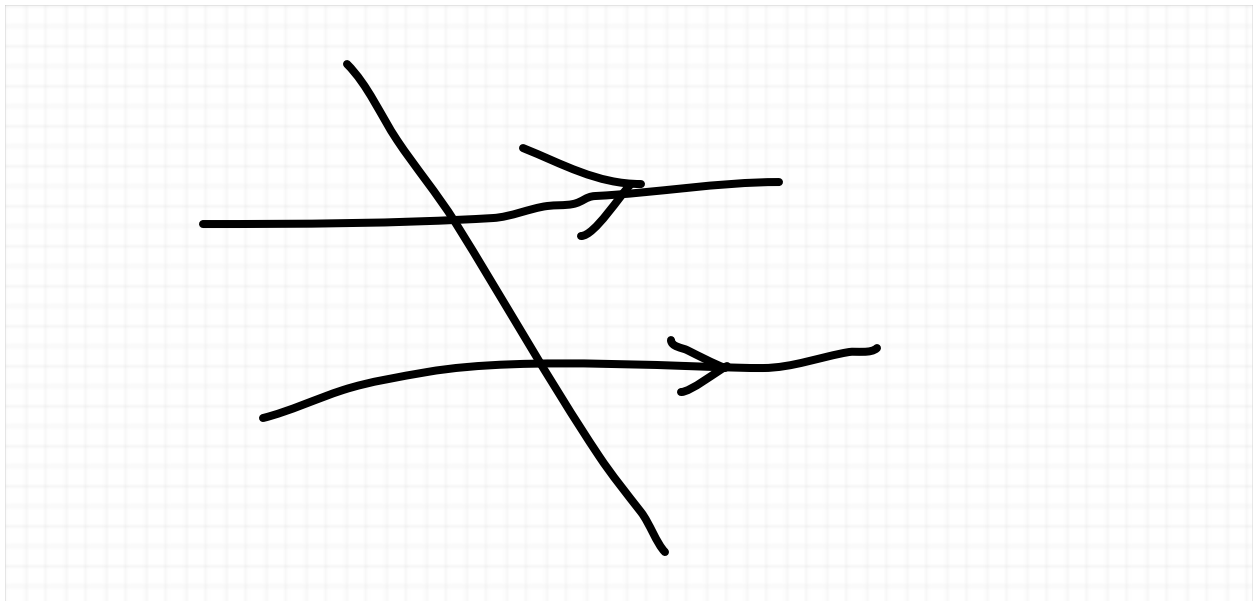
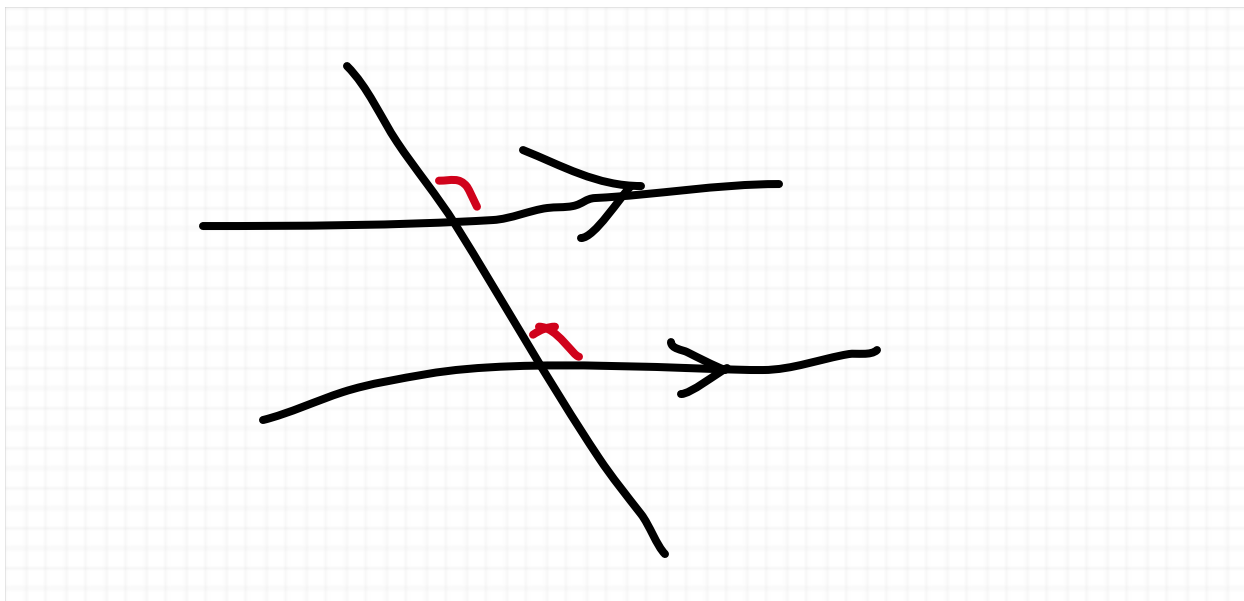# The Warm-up

Larson page 151, exercise 24-27, exercise 29-32

Some Parallel Transversal Lines

The Corresponding Angles Postulate. If two lines cut by a transversal are parallel, then the corresponding angles are congruent, i.e.
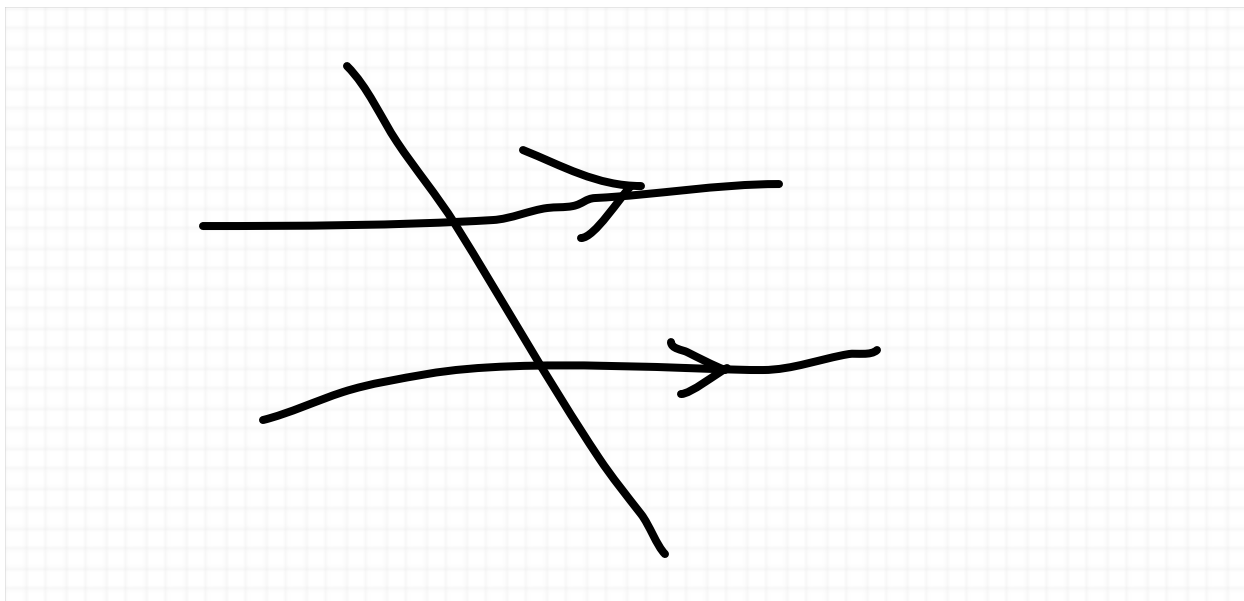
If we have the drawing below

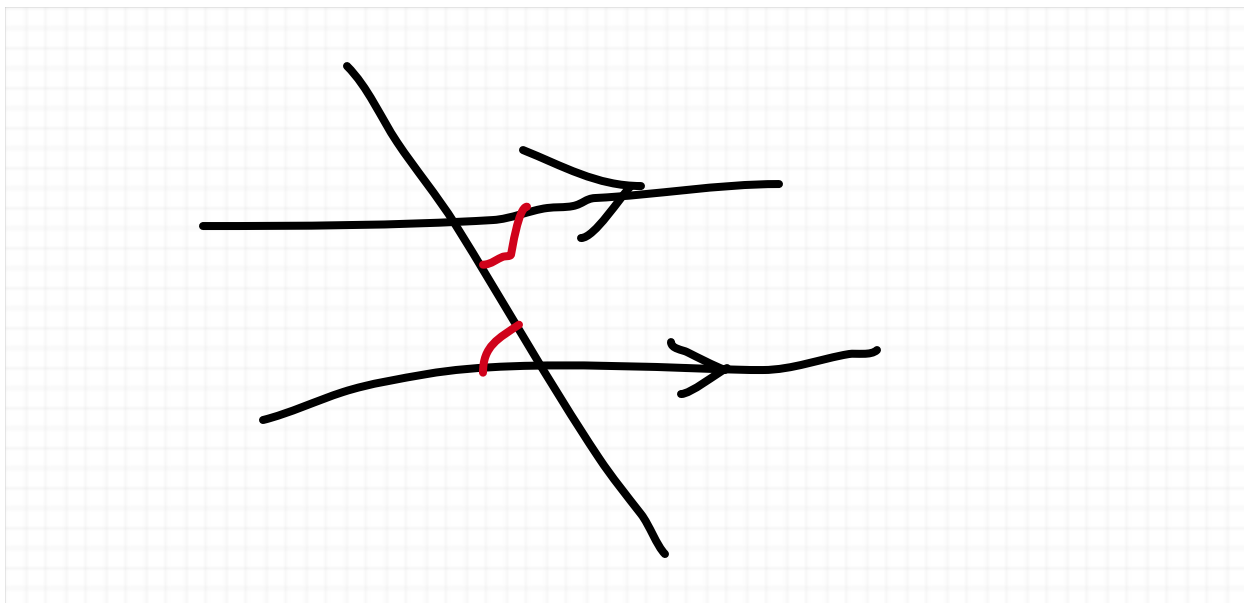Then we can also add the following feature to our drawing

Theorems.

1. Alternate Interior Angles Theorem. If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.
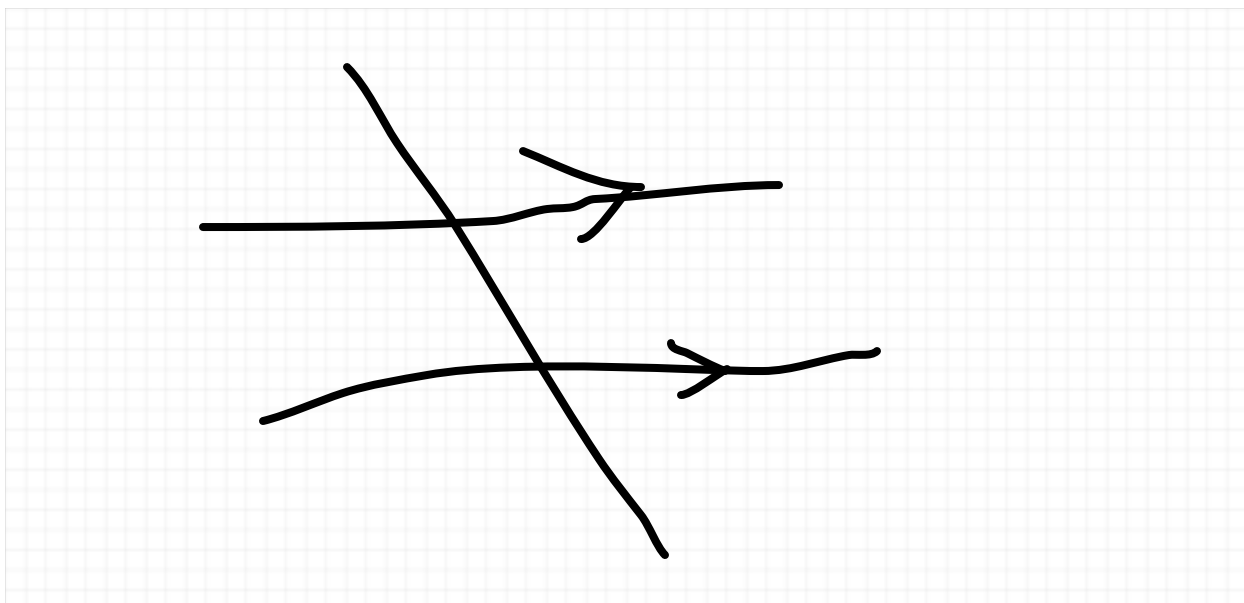
If we have the drawing below

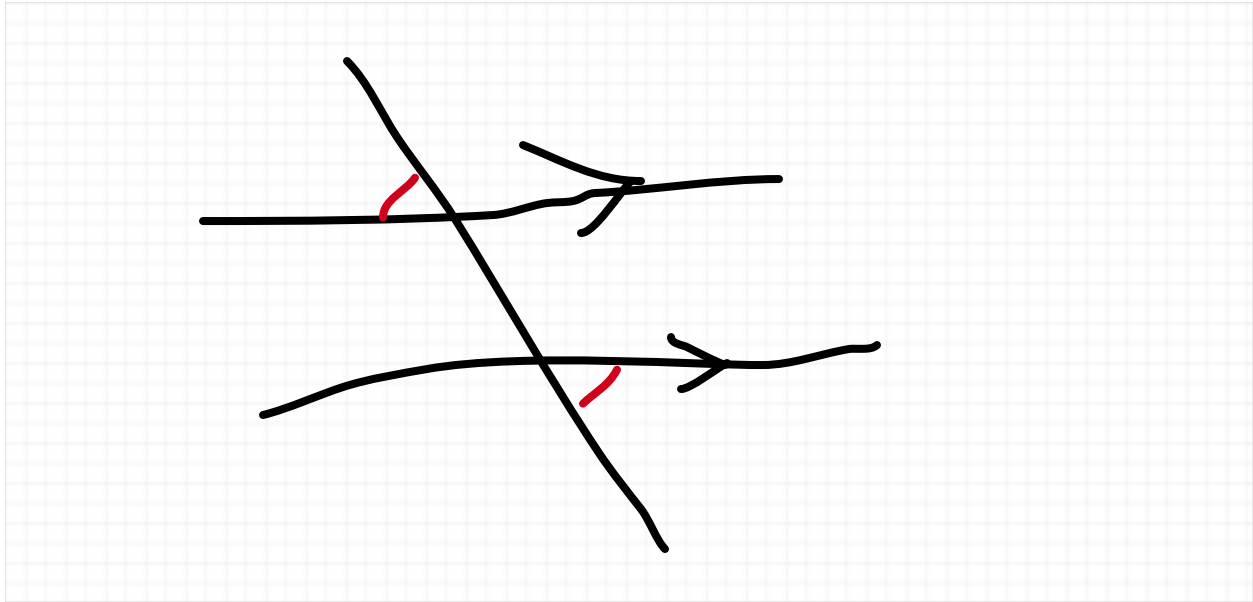Then we can also add the following feature to our drawing

2. Alternate Exterior Angles Theorem. If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent.

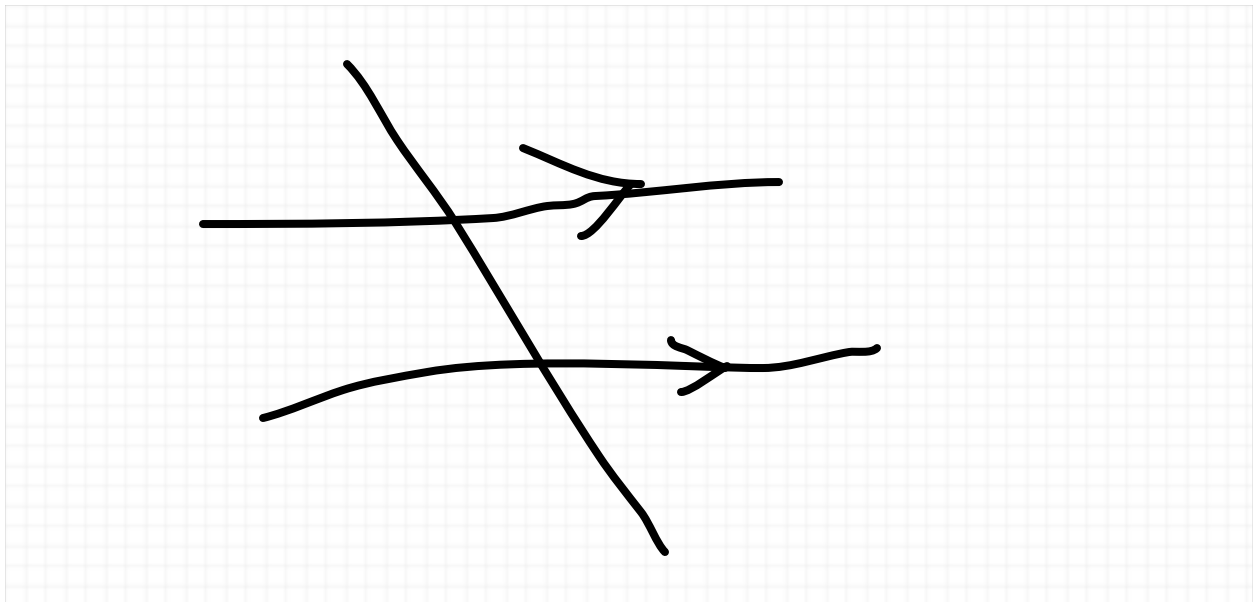If we have the drawing below

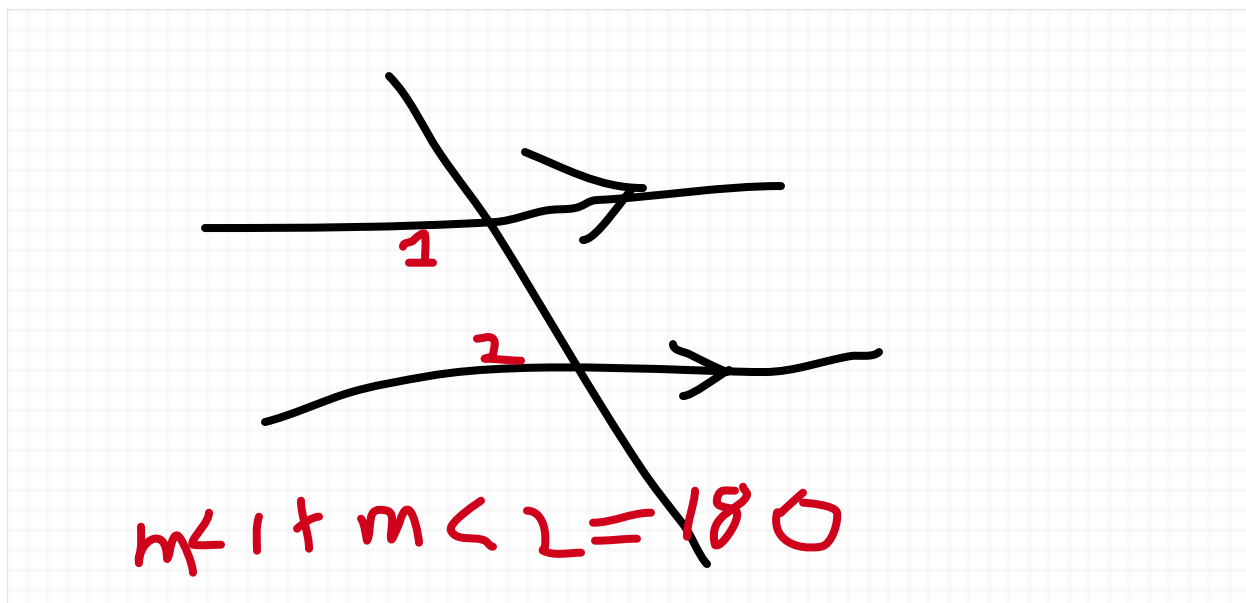Then we can also add the following feature to our drawing

3. Consecutitive Interior Angles Theorem. If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary

If we have the drawing below

Then we can also add the following feature to our drawing

$$m\angle 1 + m\angle 2 = 180$$

Proof. We shall prove the **Alternate Interior Angles Theorem** and leave the **Alternate Exterior Angles Theorem** and **Consecutitive Interior Angles Theorem** as exercises.

Statement	Reason
1. $L \parallel M$	Given
2. $\angle 1 \cong \angle 3$	Corresponding angles postulate
3. $\angle 3 \cong \angle 2$	Vertical Angles Congruence Theroem
4. $\angle 1 \cong \angle 2$	Transitive Property of Congruence
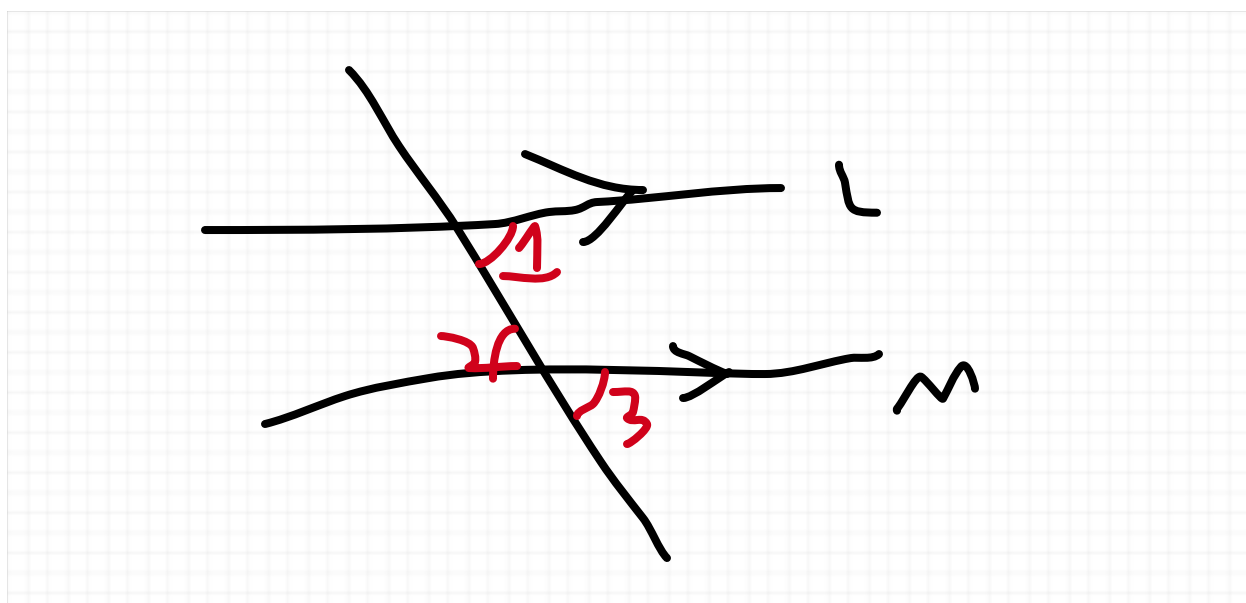
QED.

Preview for Tomorrow
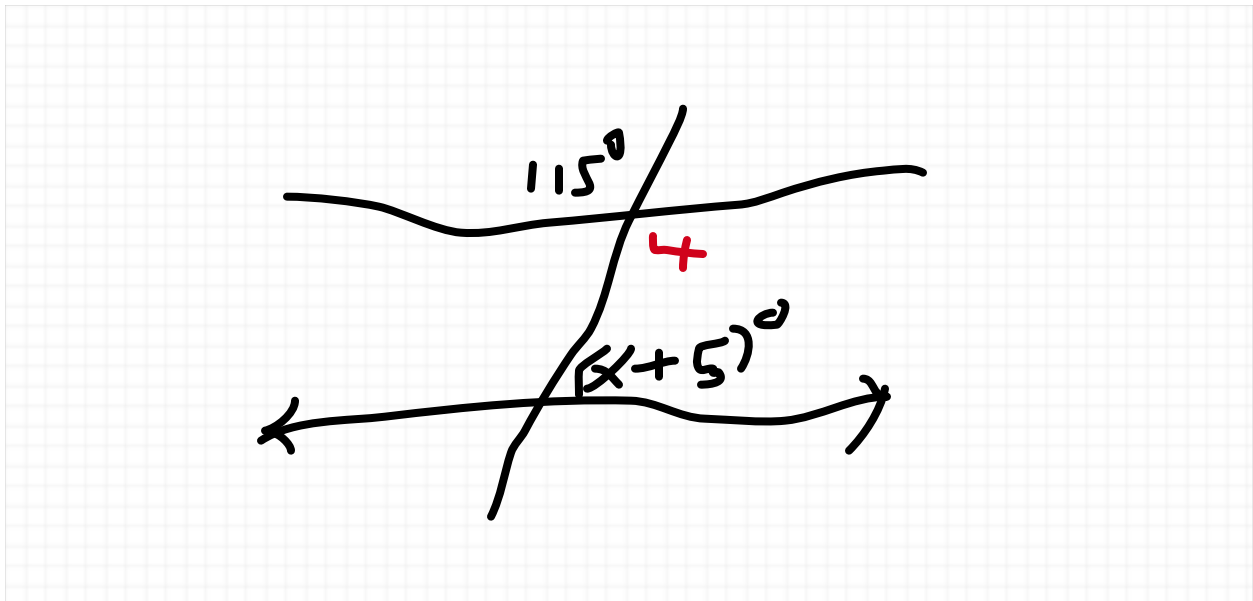
N/A

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Algebra on Transversal Lines

So one way that we apply the postulates and theorems we learned about transversal lines is doing to figure unknown angles

Example 1. *(Example 2 in 3.2)* Solve for x, and prove its solution

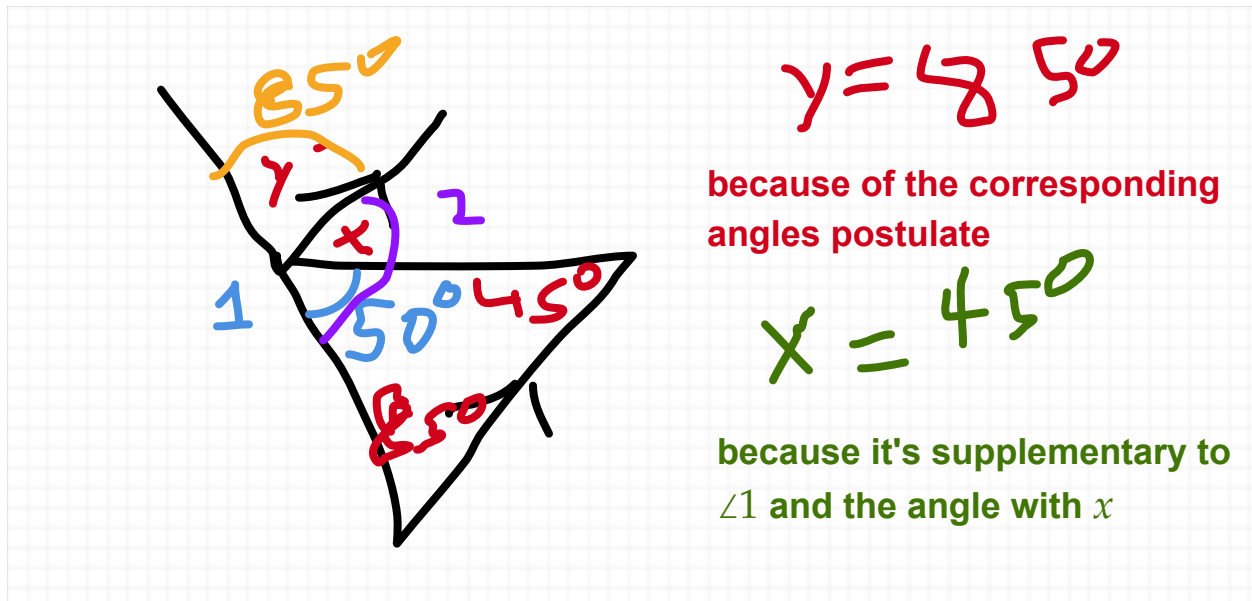$m\angle 4 + (x + 5)° = 180°$ Consecutive interior angles theorem
$m\angle 4 = 115°$ Vertical angle theorem
$115° + (x + 5)° = 180°$ Substitution property of $=$
$120° + x = 180°$ Combining like terms
$x = 60°$ subtract $120°$ on both sides

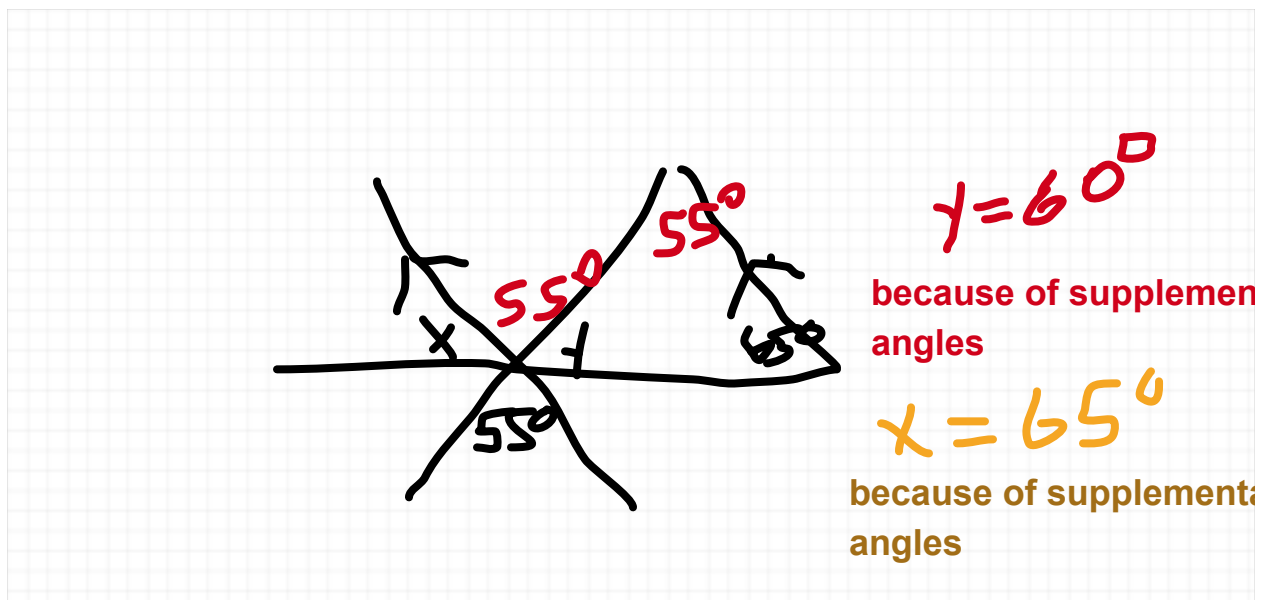**Example 2.** *(Exercise 27 in 3.2)* Solve for x and y

We basically have to use geometry (everything we know about transversal lines through

parallel lines) to set up an equality, and solve for x and y accordingly

LESSON 1 OF GEOMETRY: NEVER BASE ANYTHING OFF OF HOW IT LOOKS.

$y = \cancel{8}\ 50$

because of the corresponding angles postulate

$x = 45^\circ$

because it's supplementary to $\angle 1$ and the angle with x

Example 3. *(Exercise 29 in 3.2)* Solve for x and y.

$y = 60^\circ$

because of supplemen angles

$x = 65^\circ$

because of supplementa angles

Preview for Tomorrow

N/A

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Algebra on Transversal Lines (Cont.)

My exercise I had planned to do is TOO HARD and this portion of the lecture is CANCELLED.

## Proofy Proving that Lines are Parallel

This section starts with the following important postulate, which we call the "corresponding angles converse"

Corresponding Angles Shoe Postulate. If two lines are cut by a transversal line and their corresponding angles are congruent, then the lines are parallel.

Visually, if we have the following setup
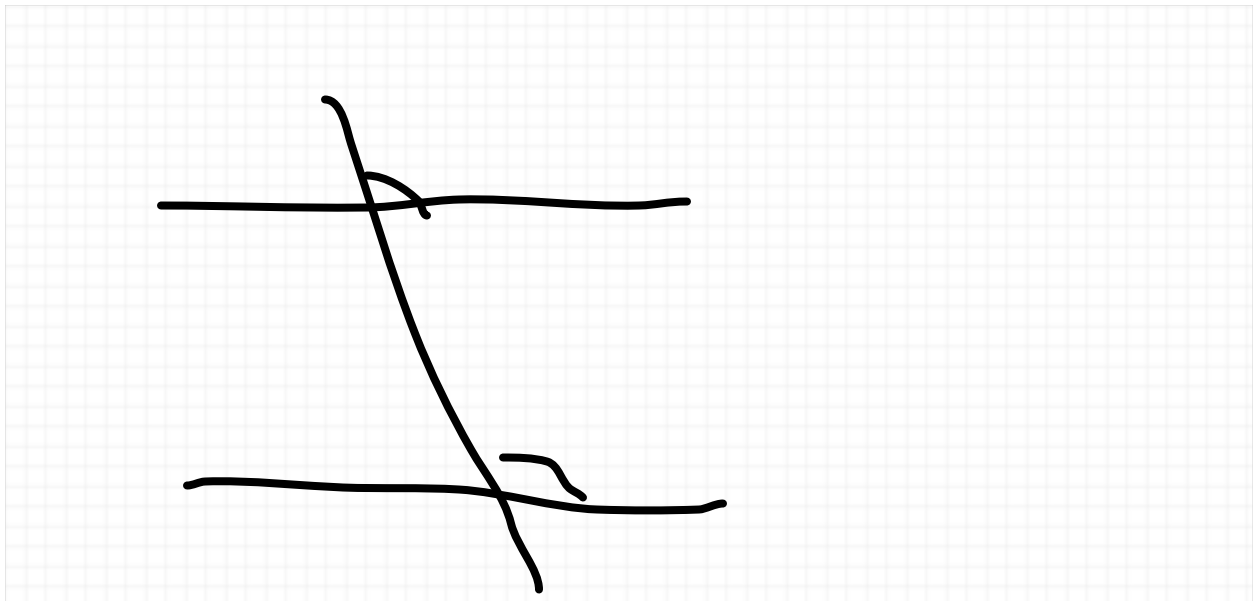
Then we can expand on this setup as follows:
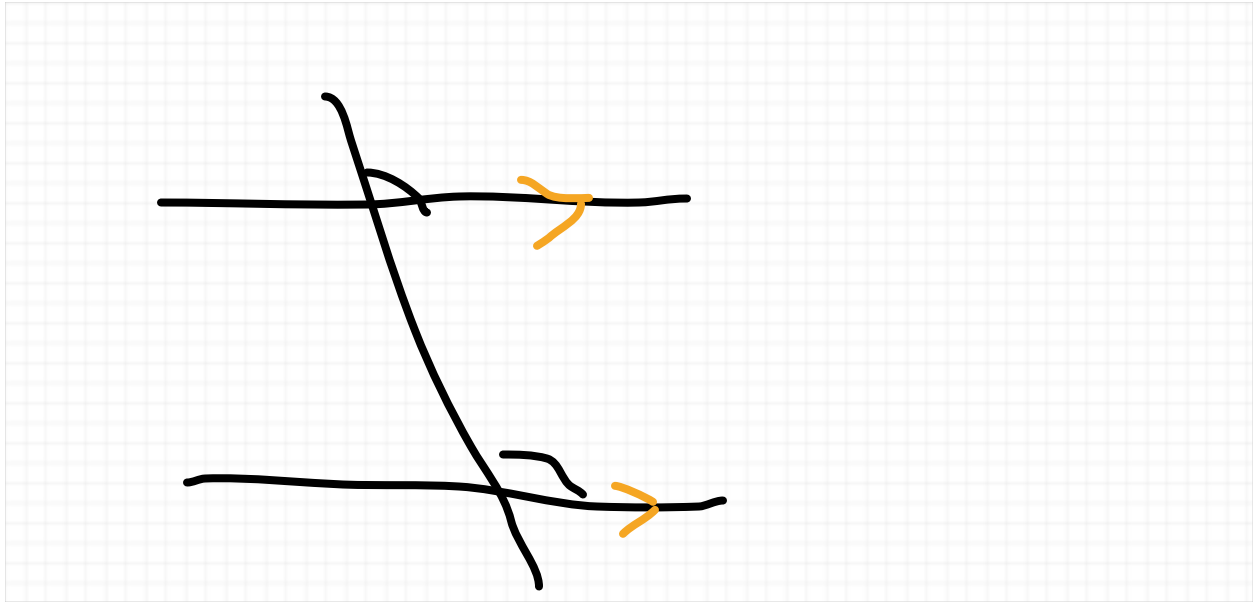
Important Note: Why we call the Corresponding Angles Shoe Postulate the "Corresponding Angles Converse Postulate" is because it's in fact the converse of the corresponding angles posulate.

So based on our postulations, it holds true that two lines divided by a transversal line are parallel if and only if they have the same angle.

Preview for Tomorrow

N/A

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We took the QUEST, and didn't really do much else.