Math 213
Sections 10.1 & 10.2

Key

Form yourselves into groups of three to answer the following questions. Turn in one copy for each group with all the group member's names on it. This worksheet is due Thursday 8/27 by 4:30 pm in my box.

Recall the labeling conventions from Tuesday. If we say that two triangles have the AAS property it means two angles and a corresponding side of one triangles are congruent to two angles and a corresponding side of another triangle, respectively.

We see there are 2^3 or 8 possible ways of recording three pieces of information (whether this be angles or side lengths). Below are the 8 possibilities:

x2

SSS ✓	SAS ✓	SSA	ASS
AAS	SAA	ASA ✓ HW	~~AAA~~

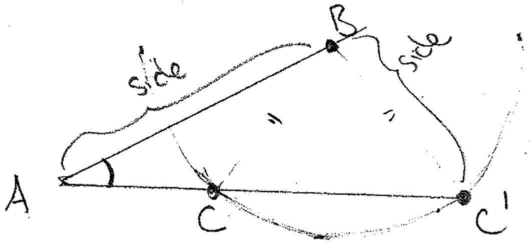
1. Mark which of the above uniquely describe a triangle up to congruence by using construction methods.

2. For any three letters not marked determine if the information does uniquely determine a triangle with construction methods. If so, explain why (by doing an argument very like what we did on Tuesday), if not, provide two triangles are not congruent but meet the particular three letter condition.

x4

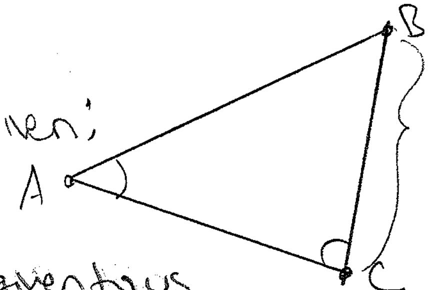
We have only 2 cases to check:

SSA or ASS:



both $\triangle ABC$ & $\triangle ABC'$ have the same SSA constraints but are clearly not $\cong$.

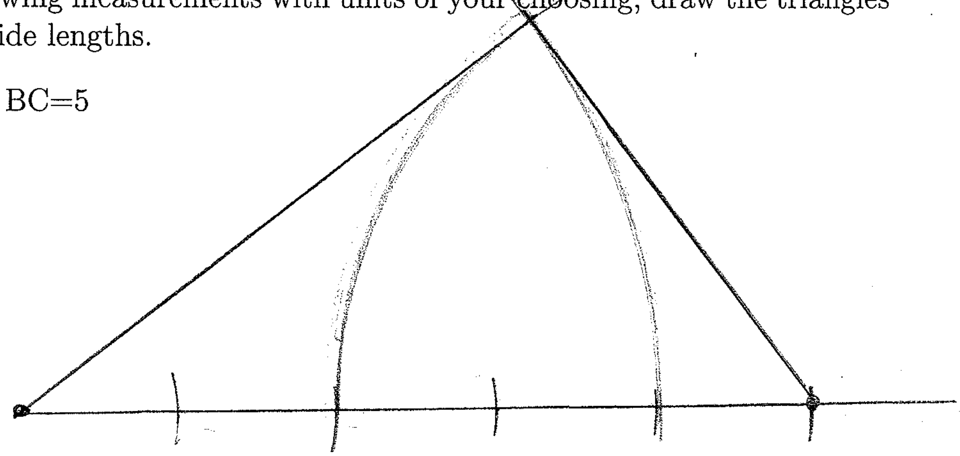
AAS or SAA. Given:



note since $\angle A$ & $\angle C$ were given to us we can construct $\angle B$. (We can copy $\angle A$ and $\angle C$ to find $\angle A + \angle C$. The supplementary angle is thus $\angle B$). Thus we have $\angle B$, $\overline{BC}$, and $\angle C$ which is an ASA which we have previously shown is enough information to uniquely determine a $\triangle$ with construction methods.

3. Triangle Inequality: Since a triangle $\triangle$ is uniquely determined by the lengths of its sides, given the following measurements with units of your choosing, draw the triangles with the following side lengths.

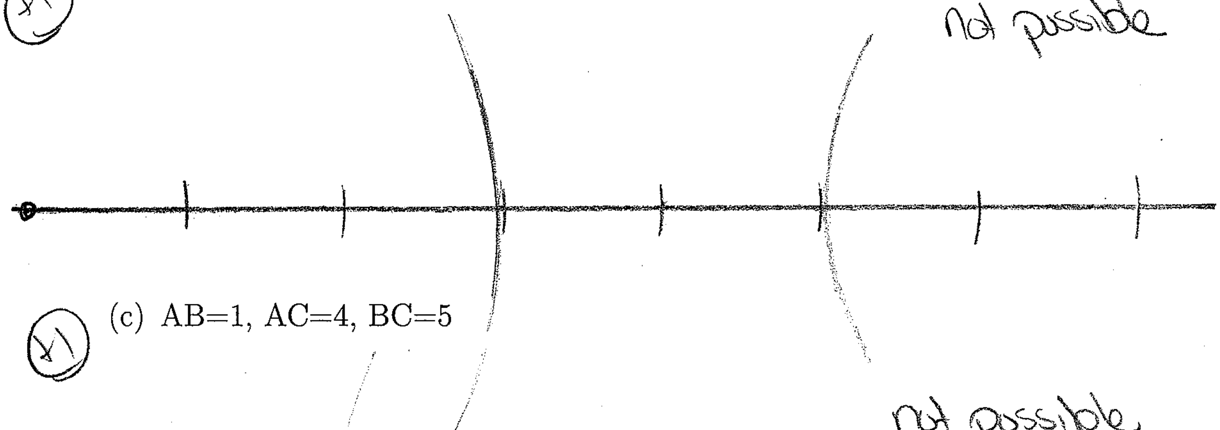
+1 (a) AB=3, AC=4, BC=5



(b) AB=2, AC=7, BC=3

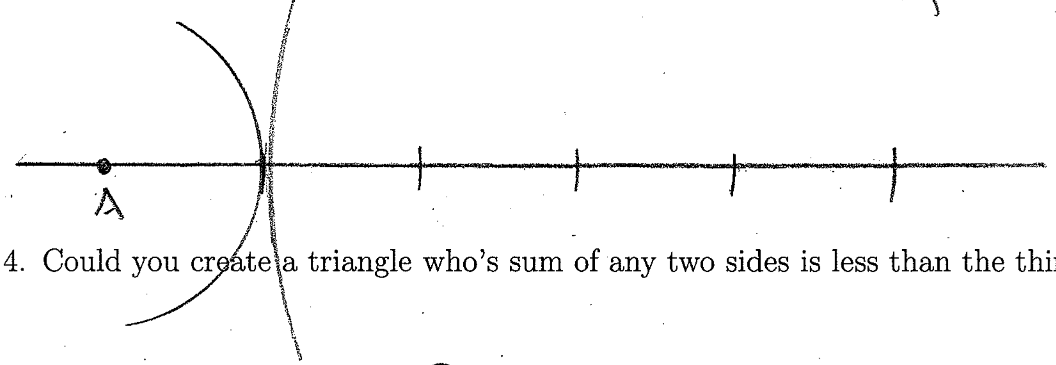
+1

not possible



+1 (c) AB=1, AC=4, BC=5

not possible



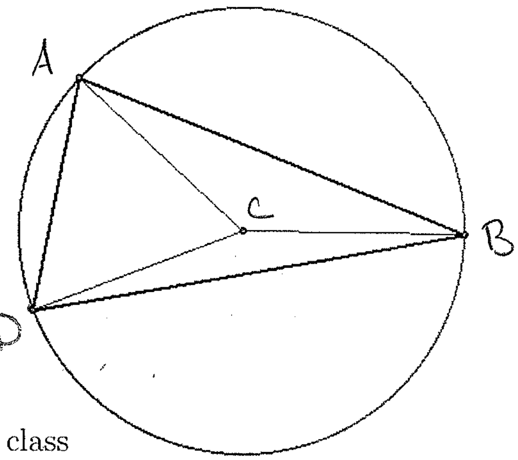
4. Could you create a triangle who's sum of any two sides is less than the third?

+1

nope.

Triangle Inequality: The sum of the measures of any two sides of a triangle must be greater than the measure of the third side.

5. Circumscribing a Triangle: Given a triangle we can find a circle C, centered such that all of the vertices of the triangle are on the circumference of the circle. The center of this circle is the circumcenter.



- What must be true about the distance from the center of the circle C, to the vertices of the triangle?

(1) They are all the same length

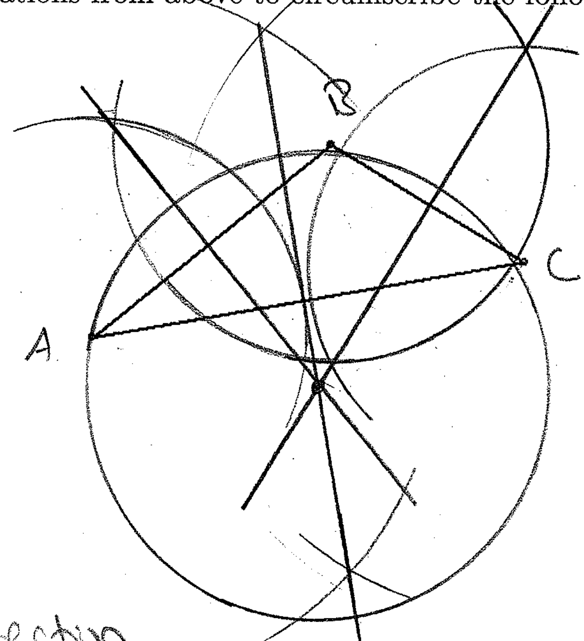
AC = CB = CD

- Look up Theorem 10.2 (which we covered in class today). Use the theorem to find out what line(s) that the center of the circle C, must lie on.

(1) C must be on the perpendicular bisector

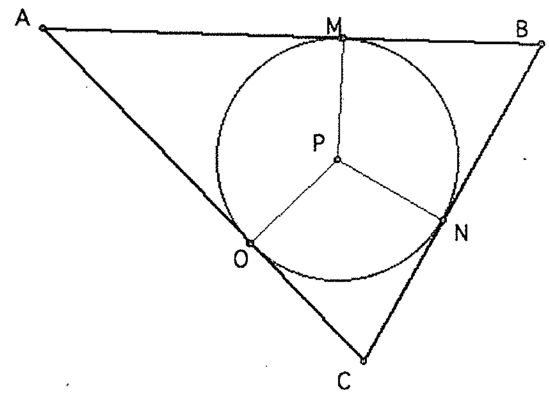
- Use your observations from above to circumscribe the following triangle:

(3) We need to construct ⊥ bisectors of $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$. The center of our circle will be at the intersection.



The radius can be set by using the distance from the intersection of the ⊥ bisectors to any of the 3 vertices.

6. Inscribing a Circle in a Triangle: Given a triangle $\triangle ABC$, we can find a circle C, centered at point P, such that the circle touches each side of the triangle only once. This point is called the incenter. Let the points both on the circle and triangle be M, N, and O as denoted in the picture below.



- What can be said about the values of PM, PN, and PO?

1

PM = PN = PO

- Equidistance came up before when investigating perpendicular bisectors, it comes up again with angle bisectors. Write down Theorem 10-3 from page 676. What line(s) is P laying on?

1

a) Any point on an angle bisector is equidistant from the sides of the angle.

b) Any point that is equidistant from the sides of an angle is on the angle bisector of the angle.

P is laying on the angle bisectors of ∠C, ∠B & ∠A

- Using Theorem 10.3 and construction help on page 671 to inscribe a circle on the triangle below.

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