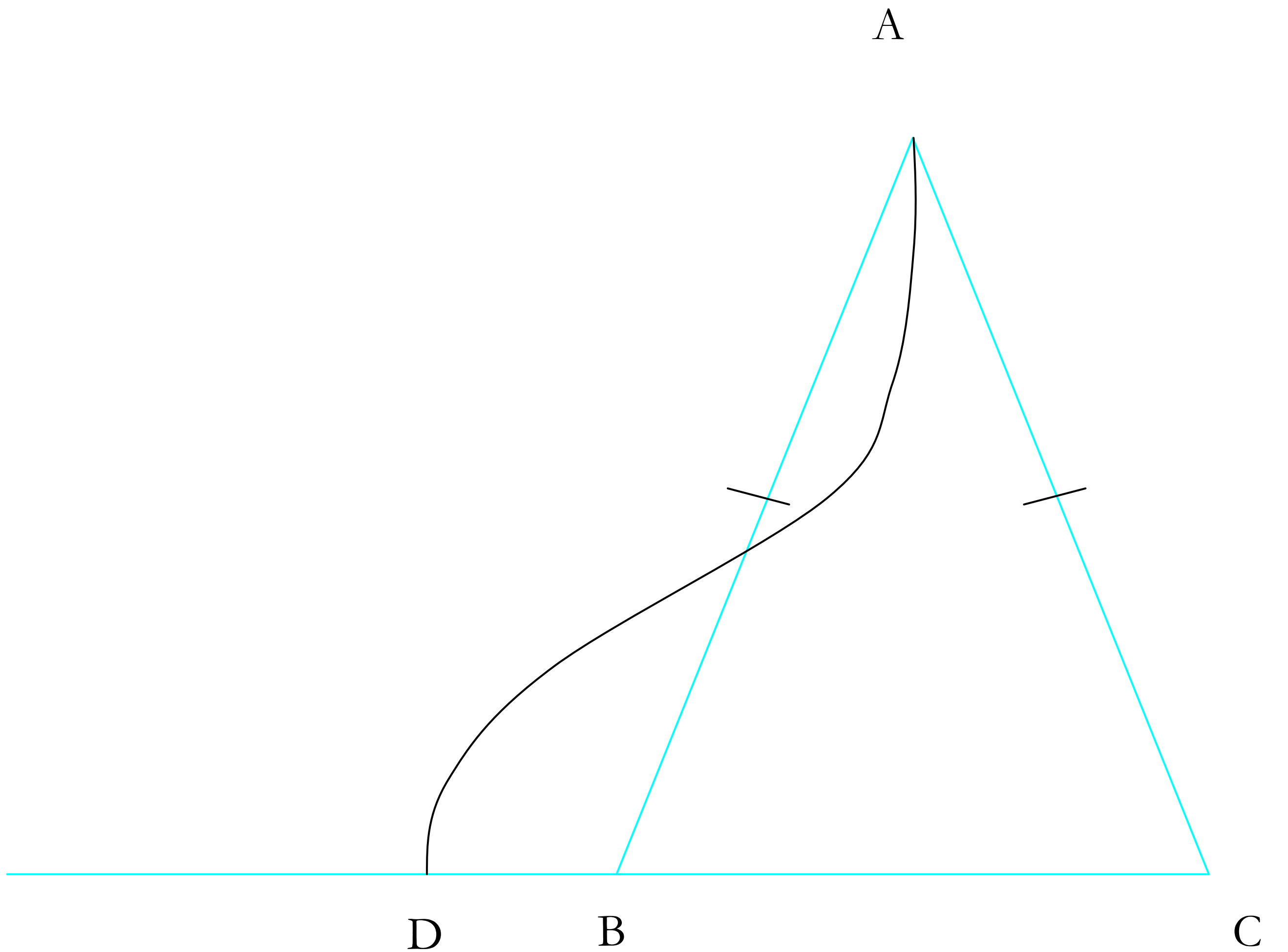
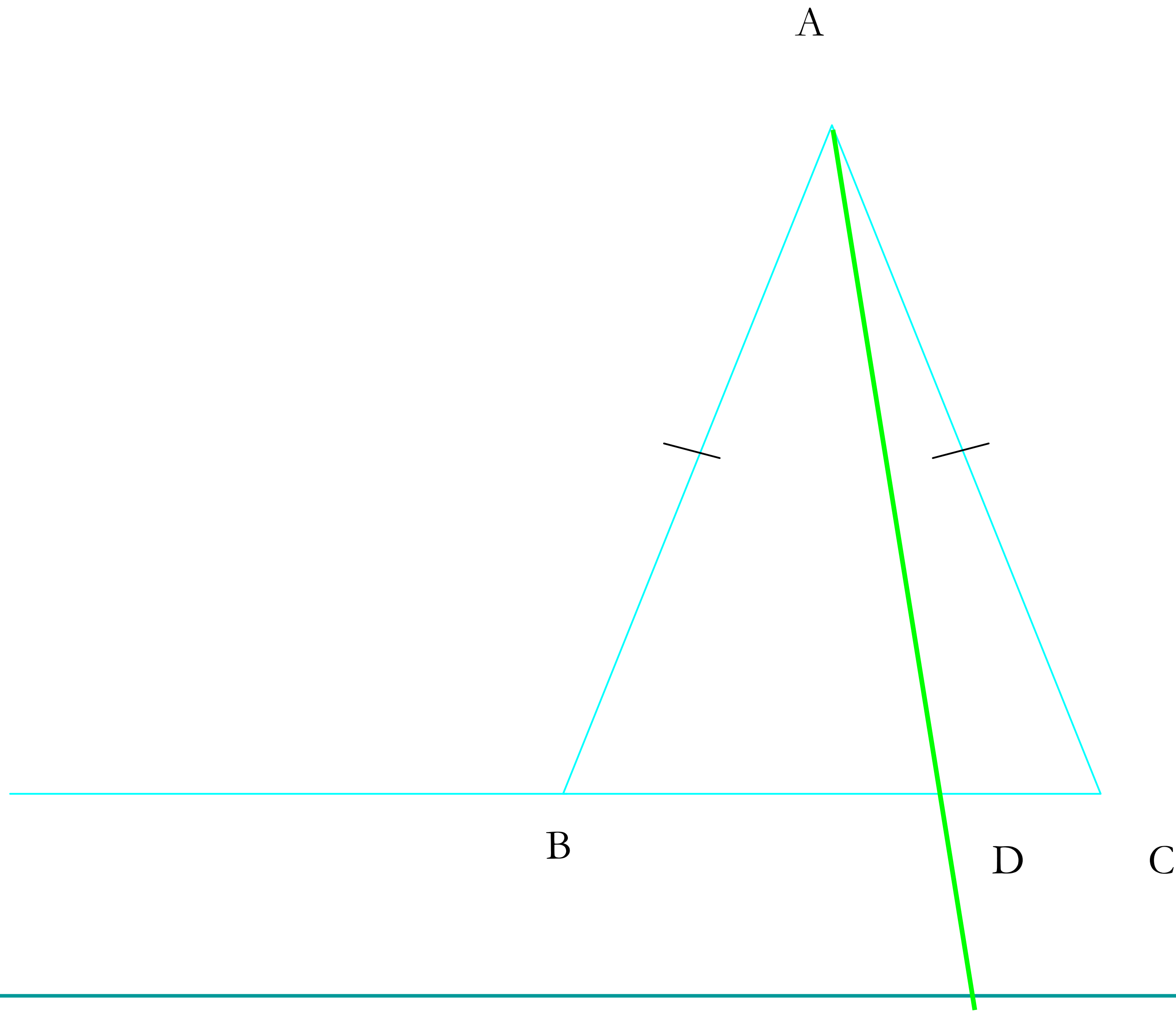
Class #19

Crossbar Theorem


A
D
B
C


A
B
D
C

Task for today:

- Ray $\overrightarrow{AD}$ is between rays $\overrightarrow{AC}$ and $\overrightarrow{AB}$ if $\overrightarrow{AB}$ and $\overrightarrow{AC}$ are distinct nonopposite rays and $D \in \text{int}(\angle BAC)$

- Prove

Crossbar Theorem: If $\overrightarrow{AD}$ is between $\overrightarrow{AC}$ and $\overrightarrow{AB}$ then $\overrightarrow{AD}$ intersects segment BC.

- Decide what other statements you need in order to prove the theorem. Come up and write on the board statements you think you need for this theorem and can prove. We will collect, compile and compare these and decide which ones we should keep.

Noon class (assume the hypotheses of Crossbar theorem):

- If $\overrightarrow{AD}$ is between $\overrightarrow{AC}$ and $\overrightarrow{AB}$ then B and C are on opposite sides of $\overleftrightarrow{AD}$.
- If $\overrightarrow{AD}$ is between $\overrightarrow{AC}$ and $\overrightarrow{AB}$ then all members of $\overrightarrow{AD}$ except for A are in the int($\measuredangle$BAC).
- B and C are on opposite sides of $\overleftrightarrow{AD}$ and $\overleftrightarrow{AD} = \overrightarrow{AD} \cup \overrightarrow{AE}$, where D*A*E.
- $\overrightarrow{AD} \cap BC \neq \varnothing$ or $\overrightarrow{AE} \cap BC \neq \varnothing$, where D*A*E.

1pm class (assume the hypotheses of Crossbar theorem):

- All points on ray $\overrightarrow{AD}$ except A lie on the interior of $\measuredangle BAC$.
- Points B and C are on opposite sides of $\overleftrightarrow{AD}$.
- If E is such that E*A*B then E and C are on the same side of $\overleftrightarrow{AD}$.
- All points on BC except B and C lie on the interior of $\measuredangle BAC$.