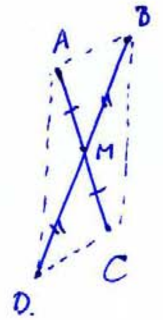
HW 11 ; -1

5.2;




- By part (b) of theorem 4.4 we have $m\angle BMA = m\angle CMD$ and $m\angle BMC = m\angle AMD$.
- As "M" is the midpoint of segments $\overline{BD}$ and $\overline{AC}$, $\Rightarrow \begin{cases} |\overline{AM}| = |\overline{MC}| \\ |\overline{BM}| = |\overline{MD}| \end{cases}$

By "SAS", $\Delta AMD \cong \Delta CMB$ (*)

(ii) As proved in (i), $\Delta AMD \cong \Delta CMB$, which, by definition of congruency, gives $|AD| = |BC|$.

(iii) By a similar argument, as in (i), $\Delta AMB \cong CMD\,\Delta$. (*)(*)
~~(iii)~~ We know that $\begin{cases} m\angle ABD = m\angle ABM. \\ m\angle BDC = m\angle BDM. \end{cases}$

By (*)(*), ~~iii~~ ~~(i)~~, $m\angle ABM = m\angle BDM$, and this gives that $m\angle ABD = m\angle BDC$.

(iv) By a similar argument as in (i), ~~BMC~~ ~~≅~~ $\hat{AMB} \cong \hat{CMD}$.
That gives; $m\angle ABM = \angle BDM$. (part (iii)).
Moreover, as $\Delta AMD \cong \Delta CMB$, $m\angle ADM = m\angle CBM$.
$\Rightarrow m\angle ABC = m\angle ABM + m\angle MBC = m\angle \overset{COM}{\cancel{ABD}} + m\angle MDA = m\angle CDA$.

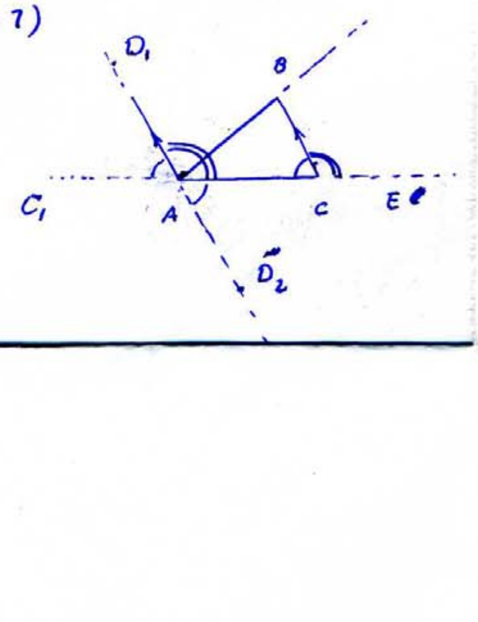
5.5) By construction of AD, and SAS, $\hat{ADB} \cong \hat{AC'B'}$. $\Rightarrow$ $|BD| = |B'C'|$. On the other hand, by assumption $|BC| = |B'C'|$, Contradicting that point "D" drops between B and C. ∎

HW11;-2;

5.6) As $AD$ lies inside $\angle BDC$, $m\angle ADC < m\angle BDC$ (*)
and similarly, as, $BC$ lies inside $\angle DCA$, $m\angle BCD < m\angle ACD$. (*)
Note that by construction $|AD| = |AC|$. Therefore, $\Delta ADC$ is an isosceles triangle. That gives $m\angle ADC = m\angle ACD$. (*).
Moreover, by construction, $|BD| = |B'C'| = |BC| \rightarrow m\angle BCD = m\angle BDC$.
contradicting (*), as (*) gives $m\angle BCD < m\angle BDC$.

5.10) Just note that $m\angle A = m\angle FCE$ (problem 5.2).
Then, as $CF$ is inside of $\angle ACD$, $\underbrace{m\angle ECF}_{m\angle A} < m\angle ECD$

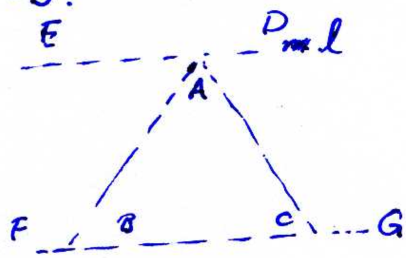
6.7)




We assume that one case, ~~namely~~ does not happen, and prove that this causes the other case happen.
Assume $D$ & $B$ lie on the same side of $CA$. Then, as $BC \parallel DA$,
$m\angle BCE = m\angle DAC$.
We know that $m\angle BCE > m\angle BAC$.
$\Rightarrow m\angle DAC > m\angle BAC \Rightarrow$.
$AB$ lies inside $\angle DAC. \Rightarrow$.
As we proved before, $DC$ intersects any line ray which lies inside the angle $\angle DAC$. $\rightarrow DC \cap AB \neq \emptyset$
$\Rightarrow D$ & $C$ lie on opposite sides of $AB$.
By definition of point inside an angle, $D$ cannot lie inside of $\angle BAC$.

HW11 -3.

(6.3)




~~As $\cancel{l \parallel BC} \Rightarrow \cancel{\angle ABC}$~~

As $AD \parallel FG$;

$$\begin{cases} m\angle DAC = m\angle ACB \\ m\angle EAB = m\angle ABC \end{cases}$$

$\Rightarrow m\angle B + m\angle C + m\angle A = .$

$m\angle EAB + m\angle DAC + m\angle A = \pi$

straight angle.