HW10;

4.3; We want to show that the point "between" A & C, that is $\overline{AC}$, lie inside $\angle ABD$.

We know that $A \in \vec{AC}$ and $A \in \vec{AD}$. To prove that an arbitrary point $P \in \vec{AC}$ lies inside the angle, we assume the negation of the statement :: Suppose $\exists P \in \vec{AC}$: P is not inside the angle, that means the line segment $\overline{PC}$ crosses ~~either~~ either $\vec{AD}$ or $\vec{AB}$.

(By definition of point inside). So, ~~if~~ there is $Q \in \overline{PC}$ s.t. $Q \in \vec{AD}$ or $Q \in \overleftrightarrow{AB}$, Recall that $Q \in \overline{PC} \subseteq \overline{AC} \subseteq \overleftrightarrow{AC}$.

By incidence axiom, as $a \in \vec{AD}, \vec{AB}$ and $\begin{cases} Q \in \overleftrightarrow{AB} \text{ OR}, \\ Q \in \vec{AD} \end{cases}$

the line $\overleftrightarrow{CA} = \overleftrightarrow{QC} = \overleftrightarrow{PC}$ must coincide with either $\overleftrightarrow{AB}$ or $\overleftrightarrow{AD}$; which contradicts "C" being ~~inside~~ inside $\angle DAB$

4.4; By paragraph "3" of protractor axiom, $\exists$ unique ray : $\vec{AD} \subseteq \mathcal{H}$, such that $m\angle BAC = \alpha$. By exercise 3.12, the point C is specified unique on $\vec{AD}$.

exercise 3.12; As we proved before, we can ~~c~~ construct a coordinate system s.t $f(A) = 0$. As $f(.)$ is a correspondence between $\mathbb{R}$ and $\overleftrightarrow{AD}$ (not the ray, the whole line), there are P & $Q \in \overleftrightarrow{AD}$ such that $f(P) = r$, $f(Q) = -r$. If P & Q both lie outside the ray $\vec{AD}$, it is a contradiction, For $f(A) = 0$, $-r < f(A) < r$, ~~while~~. So at least one of them lies in $\vec{AD}$, say P. $\rightarrow |f(P)| = |f(P) - f(A)| = |PA| = r$. ▨

4.7; By exercise 4.2, $\overline{BC}$ lies inside the angle. So if $\overline{BC} \cap \vec{AD} \neq \emptyset \rightarrow \vec{AD}$ entirely lies in the angle. ~~If $\vec{AD}$ has to have a point outside the angle~~, Because all points of $\vec{AD}$ are on the same side of ~~both~~ both $\vec{AB}$ and ~~B~~ $\vec{AC}$