Problem 8
Let $A$ be an algebra. Prove
\[ \text{Con } A = (\text{Sub } A \times A) \cap \{ \theta \mid \theta \text{ is an equivalence relation on } A \}. \]

Problem 9
Let $A$ be an algebra and let $h$ be an endomorphism of $A$. Prove that $h \circ h^{-1}$ is a congruence of $A$. Observe that $h^{-1} = \{(b, a) \mid h(a) = b \text{ and } a \in A\}$.

Problem 10
Let $A$ be an algebra and let $\theta$ be a congruence of $A$. Prove that $\theta = \bigcup \{ Cg^A(a, a') \mid a' \theta a \}$.

Problem 11
Let $A$ be an algebra and let $X \subseteq A$ such that $Sg^A X = A$. Suppose that $B$ is an algebra with the same signature and let $h$ and $g$ be homomorphisms from $A$ into $B$ such that $h(x) = g(x)$ for all $x \in X$. Prove that $h = g$. 