$$\begin{aligned}
&\iff \forall x(x \in A \to x \subseteq A) && \text{(幂集定义)}\\
&\iff \forall x(x \in A \to \forall y(y \in x \to y \in A)) && \text{(子集定义)}\\
&\iff \forall x\forall y(x \in A \to (y \in x \to y \in A)) && \text{(量词辖域扩张等值式)}\\
&\iff \forall x\forall y(\neg x \in A \lor (\neg y \in x \lor y \in A)) && \text{(蕴涵等值式)}\\
&\iff \forall x\forall y(\neg(x \in A \land y \in x) \lor y \in A) && \text{(命题逻辑德·摩根律)}\\
&\iff \forall y(\forall x\neg(x \in A \land y \in x) \lor y \in A) && \text{(量词辖域收缩等值式)}\\
&\iff \forall y(\neg\exists x(x \in A \land y \in x) \lor y \in A) && \text{(量词否定等值式)}\\
&\iff \forall y(\exists x(x \in A \land y \in x) \to y \in A) && \text{(蕴涵等值式)}\\
&\iff \forall y(y \in \cup A \to y \in A) && \text{(广义并定义)}\\
&\iff \cup A \subseteq A && \text{(子集定义)}
\end{aligned}$$

□

5.

证明：证法一：

$$\begin{aligned}
& g \in Ag && (e \in A)\\
\iff\ & g \in Bh && (Ag = Bh)\\
\iff\ & Bg = Bh && \text{(教材定理 17.22)}\\
\iff\ & Bg = Ag && (Ag = Bh)\\
\implies\ & \forall b(b \in B \to \exists a(a \in A \land bg = ag)) && \text{(陪集定义)}\\
\implies\ & \forall b(b \in B \to \exists a(a \in A \land b = a)) && \text{(消去律)}\\
\iff\ & \forall b(b \in B \to b \in A) && (b = a)\\
\iff\ & B \subseteq A && \text{(子集定义)}
\end{aligned}$$

同理可证 $A \subseteq B$。所以有 $A = B$。 □